EFFECTIVENESS OF HYDROGEN PEROXIDE DRESSING VERSUS BETADINE DRESSING ON PIN SITE INFECTION AMONG PATIENTS WITH EXTERNAL SKELETAL FIXATORS IN ORTHOPAEDIC WARD AT GOVERNMENT RAJAJI HOSPITAL MADURAI

M.Sc (NURSING) DEGREE EXAMINATION

BRANCH – I MEDICAL SURGICAL NURSING

COLLEGE OF NURSING

MADURAI MEDICALCOLLEGE, MADURAI-20.

A dissertation submitted to

THE TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY,

CHENNAI - 600 032.

In partial fulfillment of the requirement for the degree

MASTER OF SCIENCE IN NURSING

APRIL 2015

EFFECTIVENESS OF HYDROGEN PEROXIDE DRESSING VERSUS BETADINE DRESSING ON PIN SITE INFECTION AMONG PATIENTS WITH EXTERNAL SKELETAL FIXATORS IN ORTHOPAEDIC WARD AT GOVERNMENT RAJAJI HOSPITAL MADURAI

Approved by Dissertation committee on……

Professor in Nursing Research _____

Mrs.S.POONGUZHALI M.Sc., (N), M.A., M.BA., Ph.D.,
PRINCIPAL,
COLLEGE OF NURSING,
MADURAI MEDICAL COLLEGE,
MADURAI-20.

Clinical Specialty Expert _____

Mrs.J.ALAMELUMANGAI.,M.Sc(N),MBA(HM).,
FACULTY IN NURSING,
DEPARTMENT OF MEDICAL SURGICAL NURSING,
COLLEGE OF NURSING,
MADURAI MEDICAL COLLEGE,
MADURAI-20.

Medical Expert _____

PROF.Dr.P.V.PUGALENTHI.,M.S.ORTHO.,D.ORTHO.,
CHIEF CIVIL SURGEON IN ORTHOPAEDIC SURGERY,
GOVERNMENT RAJAJI HOSPITAL,
PROF.OF ORTHOPAEDIC SURGERY & TRAUMATOLOGY,
MADURAI MEDICAL COLLEGE,
MADURAI-20.

A dissertation submitted to

THE TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY,

CHENNAI - 600 032.

In partial fulfillment of the requirement for the degree of

MASTER OF SCIENCE IN NURSING

APRIL – 2015

CERTIFICATE

This is to certify that this dissertation titled**, "EFFECTIVENESS OF HYDROGEN PEROXIDE DRESSING VERSUS BETADINE DRESSING ON PIN SITE INFECTION AMONG PATIENTS WITH EXTERNAL SKELETAL FIXATORS IN ORTHOPAEDIC WARD AT GOVERNMENT RAJAJI HOSPITAL, MADURAI-20"** is a bonafide work done by **Miss. J.MANIMOZHI,** M.Sc(N) student, College of Nursing, Madurai Medical College, Madurai - 20, submitted to **THE TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY, CHENNAI-32** in partial fulfillment of the requirement for the award of the Degree of **MASTER OF SCIENCE IN NURSING, Branch- I, Medical Surgical Nursing** under our guidance and supervision during the academic period from 2013 – 2015.

Mrs.S.POONGUZHALI, M.Sc (N), M.A., M.B.A., Ph.D.,
PRINCIPAL,
COLLEGE OF NURSING,
MADURAI MEDICAL COLLEGE,
MADURAI-20.

CAPTAIN Dr.B.SANTHAKUMAR, M.Sc(F.Sc),M.D(F.M), PGDMLE, Dip.N.B(F.M)
DEAN,
MADURAI MEDICAL COLLEGE,
MADURAI-20.

CERTIFICATE

This is to certify that this dissertation entitled**, "EFFECTIVENESS OF HYDROGEN PEROXIDE DRESSING VERSUS BETADINE DRESSING ON PIN SITE INFECTION AMONG PATIENTS WITH EXTERNAL SKELETAL FIXATORS IN ORTHOPAEDIC WARD AT GOVERNMENT RAJAJI HOSPITAL, MADURAI-20"** is a bonafide work done by **Miss. J.MANIMOZHI,** College of Nursing, Madurai Medical College, Madurai - 20, in partial fulfillment of the University rules and regulations for award of **MASTER OF SCIENCE IN NURSING, Branch-I, Medical Surgical Nursing,** under my guidance and supervision during the academic year 2013-15.

Name and Signature of the Guide_____

Mrs.J.ALAMELUMANGAI., M.Sc (N).,MBA(HM).,
Faculty in Nursing,
Department of Medical Surgical Nursing,
College of Nursing,
Madurai Medical College,
Madurai-20.

Name and Signature of the Head of Department_____

Mrs.S.POONGUZHALI,M.Sc(N)., M.A., M.B.A., Ph.D.,
Principal,
College of Nursing,
Madurai Medical College,
Madurai.

Name and signature of the Dean _____
CAPTIAN Dr.B.SANTHAKUMAR,
M.Sc(F.Sc).,M.D(F.M).,PGDMLE.,Dip.N.B(F.M).,
Dean,
Madurai Medical College,
Madurai.

ACKNOWLEDGEMENT

"GOD NEVER ENDS ANYTHING ON A NEGATIVE; GOD ALWAYS ENDS ON POSITIVE."

-A. Edwin Louis cole.

I wish to acknowledge my sincere and heartfelt gratitude to **GOD ALMIGHTY** for continuous support, strength and guidance from beginning to the end of the study.

I would like to express my deep and sincere gratitude to **CAPTIAN Dr.B.SANTHAKUMAR., M.Sc(FSc), MD(FM)., PGDMLE., DIPNB(FM)., Dean, Madurai Medical College, Madurai,** for his acceptance and approval for the study.

I express my heartfelt thanks to **Mrs. S. POONGUZHALI., M.Sc.,(N), M.A., M.BA., Ph.D., Principal, College of Nursing, Madurai Medical College, Madurai** for granting permission to conduct the research and for providing her continuous support, constant encouragement and valuable suggestions which helped me to completing the study.

I extend my heartfelt and faithful thanks to my clinical specialty guide **Mrs. J.ALAMELU MANGAI., M.Sc (N)., MBA(HM)**., Faculty, Department of Medical and Surgical Nursing, College of Nursing, Madurai Medical College, Madurai for her timely assistance and guidance in pursuing the study.

I express my heartful thanks to **Mrs.P.GOKILAMANI M.Sc(N).,** Lecturer, Department of Medical and Surgical Nursing, College of Nursing, Madurai Medical College, Madurai for her guidance and continuous support throughout the study.

I Wish to express my sincere heartfelt thanks to **Mrs.S.MUNIAMMAL, M.Sc(N).,** Faculty**,** Department of Medical and Surgical Nursing, College of Nursing, Madurai Medical College, Madurai for her guidance and continuous support throughout the study.

I Wish to express my deep sense of gratitude thanks to **Mrs.S.SUROSEMANI, M.Sc(N).,** Faculty**,** Department of Medical and Surgical Nursing, College of Nursing, Madurai Medical College, Madurai for her guidance and continuous support throughout the study.

I Wish to express my deep sense of gratitude thanks to **Mrs.R.RAMA, M.Sc(N)** Faculty**,** Department of Medical and Surgical Nursing, College of Nursing, Madurai Medical College, Madurai for her guidance and continuous support throughout the study.

I wish to express my grateful thanks to **ALL FACULTIES OF COLLEGE OF NURSING,** Madurai Medical College, Madurai for all their valuable support and guidance rendered to me during my study period.

My sincere thanks to **Dr. Prof. Dr. P.V. PUGALENTHI., M.S. ORTHO., D. ORTHO.,** Chief Civil Surgeon in Orthopaedic Surgery, Government Rajaji Hospital, Prof. of Orthopaedic Surgery & Traumatology, Madurai Medical College, Madurai. For giving his valuable suggestions and guidance to complete this study.

I wish to express my sincere heartfelt thanks and gratitude to **Dr.S.RAMANATHAN,M.S.ORTHO.,** Associate Professor, Department of Orthopaedics, Government Rajaji Hospital, Madurai for giving his valuable suggestions and guidance to complete this study.

It is my pleasure and privilege to express my deep sense of gratitude to **Dr. Prof. Dr. P.V. PUGALENTHI., M.S. ORTHO., D. ORTHO.,** Chief Civil Surgeon in Orthopaedic Surgery, **Dr.Mrs. SARASRINISHA., M.Sc(N).,PhD., Reader in Nursing,** Rani Meyyammai College of Nursing, Annamalai University. **Mrs. G.JAYA THANGASELVI, M.Sc (N). Professor**, Head of the Department, Medical and Surgical Nursing. CSI Jeyaraj Annabackiam College of Nursing, Madurai. **Mrs.G.SUMATHI**, **M.Sc(N) Associate Professor,** Dhanalakshmi Srinivasan College of Nursing. Perambalur. **Mr. L.ANAND**, **M.Sc(N)., Lecturer,** College of Nursing, NEIGRIHMS, Shillong for validating tool for this study.

I wish to express my sincere thanks to **Mr. MANI VELUSAMY,M.Sc., (STATISTICIAN)** for extending necessary guidance for statistical analysis.

I also thank**, Mr.N.SELVAKUMAR, M.A**.**B.Ed.,** PG Assistant in English Government Higher Secondary School, Vettaikkaraniruppu, Nagapattinam, for his suggestions and correction of English tool.

I also thank**, Mr.T.KARTHIKEYAN, M.A.B.Ed.,** PG Assistant in Tamil Government Higher Secondary School, Vettaikkaraniruppu, Nagapattinam, for his suggestions and correction of Tamil tool.

I express my thanks to **Mr. KALAI SELVAN**, **M.A,** Librarian**, College of Nursing, Madurai Medical College, Madurai,** for his guidance and support.

I wish to thank to the **STAFF NURSES** of department of orthopaedics at Government Rajaji Hospital, Madurai who have extended their cooperation during the study.

I would like to express my deepest thanks to all the **EXTERNAL FIXATORS PATIENTS,** in orthopaedic ward, at Government Rajaji hospital, Madurai, who had participated in the study without them it would have been impossible to complete this study.

I owe my great sense of gratitude to **Mr. R. RAJKUMAR, B.Com., Sai graphics**, and **Mrs.M.ANANTHI,** for their enthusiastic help and sincere effort in typing the manuscript with much value computer skills and also for the translation of the tool.

A word of appreciation to **LASERPOINT, Madurai** for untiring, innovative, diligent effort for carefully printing my dissertation.

I wish to express my sincere heartfelt thanks and gratitude to **Ms.P.KAVITHA,M.Sc(N).,** for her support and constant encouragement throughout this study.

I wish to express my sincere heartfelt thanks and gratitude to **Mr.S.VINOTH, M.Sc(N).,** for his support and constant encouragement throughout this study.

My heartful gratitude to **Mrs. B. MAHESWARI,M.Sc(N)., Mrs. S. RANI, M.Sc(N)., Mrs. M.S. SANTHI,M.Sc(N)., Mrs. FARZANAFARVEEN, M.Sc(N)., Mrs. P. KALPANA,M.Sc(N)., Ms. T. MUGESHWARI,M.Sc(N)., Mrs. R. SARANYA, M.Sc(N)., MS.VANITHA, M.Sc(N)., Mrs.LATHA,M.Sc(N)., Mrs.AMUTHAVALLI, M.Sc(N)., Mrs.P.REVATHI, M.Sc(N).,** for supports and constant encouragement.

My heartful gratitude to **Mrs. K. PUNITHALAKSHMI, M.Sc(N)., Mrs. R. NAGANANTHINI,M.Sc(N)., Mrs.S.LAKSHMIDEVI, M.Sc(N)., Mrs.J.DHANALAKSHMI, M.Sc(N)., Mrs.PONKIRUTINAVENI, M.Sc(N)., Ms. K. GAYATHRI, M.Sc(N)., Mrs N. AKILA, M.Sc(N)., Mrs. N.ANANTHI, M.Sc(N)., Ms.THENMOZHI, B.Sc(N)., Mrs.REVATHI, B.Sc(N).,** for supports and constant encouragement.

I wish to express my heartfelt thanks and gratitude to **Mrs.A.PETCHIAMMAL,M.SC(N)., Mrs.SUDHA,M.SC(N)., Ms.SIVA SANKARI., M.Sc(N)., Mrs.EZHILARASI,M.Sc(N).,** for supports and constant encouragement.

My heartful gratitude to **Mrs.J.SATHIYAPRIYA,M.Sc(N)., Mrs.JERONE, M.Sc(N)., Mrs.SHYAMALA,M.Sc(N)., Mrs.M.VIDHUSHINI,B.Sc(N)., Ms.S.ARTHI., Mrs.MOHANA,B.Sc(N)., Mrs.R.SARANYA.,B.Sc(N)., Ms.SARANYA DEVI,B.Sc(N)., M.LAKSMI,M.Sc(N).,** for supports and constant encouragement.

My grateful thanks to my beloved parents **Mr.V.S.JEEVANANTHAM, Mrs.J.KASTHURI** for love, support and constant encouragement throughout this study.

I extend my gratitude wholeheartedly to my uncle and aunty, **Mr. C.KUNJAIYAN, Mrs.K.KASTHURI,** for trusting in my abilities and giving more love and care throughout my study.

I have immense pleasure to acknowledge my lovable brothers **Mr. J.VENKADESH,DME., Mr.C.K.SARAVANAN**, and **C.K. KUMAR, D.TEd.,** who have been the backbone of the endeavor, source of encouragement, continuous help, support and motivation throughout tenure of the study.

My grateful thanks to my beloved friends **T.ASHA, K.MANORANJITHM, B.SANDHIYA, A.AMUTHA SANTHI, G.THANGA ANUSHA BELL, S.DIVAYA BALA, I.DEVAPON PUSPHAM, A.MAGAMUTHA BEGUM, K.SUDEESH KUMAR, C.M JAGADEESH,** for support and constant encouragement throughout this study.

I certainly owe my gratitude to my colleagues **Mrs. R.LATHA, Mrs.P.RAMJAN BEGAM, Mrs.V.SUBASHINI, Mrs.G.SUNITHA** and all my classmates who provided encouragement, and supported me to complete the study.

ABSTRACT

Title : Effectiveness of hydrogen peroxide dressing versus Betadine dressing on pin site infection among patients with external skeletal fixators in orthopaedic ward at Government Rajaji Hospital, Madurai-20.**Objectives:** To assess the level of pin site infection among patients with external skeletal fixators in orthopaedic ward at Government Rajaji Hospital, Madurai-20. To evaluate the effectiveness of hydrogen peroxide dressing in experimental group I and betadine dressing in experimental group II. To compare the effectiveness between hydrogen peroxide dressing in experimental group I and Betadine dressing in experimental group II.To associate the level of pine site infection among experimental group I and group II patients with external skeletal fixator and their selected demographic variables. **Hypotheses**: The mean post assessment scores of pin site infection among experimental group I and group II will be significantly lower than the mean pre assessment scores of the experimental group I and group II. There is a significant difference between the level of pine site infection for experimental group I and group II. There is a significant association between the level of pin site infection among experimental group I and group II patients with their selected demographic variables. **Conceptual frame work:** Modified Imogene King's Goal Attainment Theory (1981). **Methodology :** True - Experimental comparative design was used and the study was conducted in orthopaedic ward at Government Rajaji Hospital, Madurai.-20. The sample size was 60 ,30 in each group I and group II assigned by Simple random sampling-lottery method. Checkett's and otter burn's grading system was used to assess the level of pin site infection. The intervention was hydrogen peroxide dressing in group I and betadine dressing in group II for once a day for 7days.The post test was done at 8th day by same tool . The data were collected tabulated and analyzed by descriptive and inferential statistics. **Results:** Comparison of post test levels of pin site infection among patients with external skeletal fixators in experimental group I and experimental group II. The mean difference between the post test levels was 9. The Z value was 2.618 and p value was 0.000 which was significant at $P< 0.001$ level which showed hydrogen peroxide dressing was effective in treating pin site infection. **Conclusion:** This study statistically proved intervention of hydrogen peroxide dressing was effective on pin site infection compared to betadine dressing.

TABLE OF COTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

APPENDIX NO	TITLE
I	Letter seeking and granting permission to conduct the study in Orthopaedic Ward at Government Rajaji Hospital, Madurai
II	Ethical committee approval letter
III	Content validity certificates
IV	Informed Consent Form
V	Research Tool – Tamil
VI	Research Tool – English
VII	English Editing Certificate
VIII	Tamil Editing Certificate
IX	Photographs

LIST OF ABBREVIATIONS

WHO	– World Health Organization
H_2O_2	– Hydrogen Peroxide
PSI	– Pin Site Infection
TSF	– Taylor Spatial frame
PHMB	– Polyhexamethylene biguanide gauze
RCT	– Randomized Controlled Trails
ExFix	– External Fixator
PVPI	– Polyvinyl Pyrrolidone – iodine
PTI	– Pin Tract Infection
SD	– Standard Deviation

Introduction

CHAPTER - I

INTRODUCTION

"An ounce of prevention is worth a pound"

-**Benjamin Franklin.**

Bone are specialized, highly vascular, constantly changing and mineralized connective tissue. They are hard, resilient and have enormous regenerative capacity (PR Ashalatha etal., 2011).

A fracture is a disruption or break in the continuity of the structure of bone. Traumatic injuries account for the majority of fractures, although some fractures are secondary to a disease process; i.e., pathological fracture (Lewis et al., 2011).

The presents information on road safety from 182 countries, accounting for almost 99% of the world's population. The report indicates that worldwide the total number of road traffic deaths remains unacceptably high at 1.24 million per year. Only 28 countries, covering 7% of the world's population, have comprehensive road safety laws on five key risk factors are drinking and driving, speeding, and failing to use motorcycle helmets, seat-belts, and child restraints (The Global status report on road safety, 2013).

Modern industrialized life and increasing incidents of road accidents and other incidents have led to an increased incidence of fractures. Each year 1.6million cases of hip occurs world wide, out of which 13% to 37% lose their lives. 90% of these fractures occur in individuals older than 50 years old. In younger patients, fractures are usually the result of high-energy physical traumas such as motor vehicle accidents

and usually occur in the absence of any underlying disease. Morbidity and mortality of these fractures are high. Following hip fractures, 50% of patients are unable to walk without aid and 25% requires long-term care (Archives of trauma research, 2013).

India has the highest number of road accidents in the world. Road accidents have earned India a dubious distinction. With over 130,000 deaths annually, the country has overtaken China and now has the worst road traffic accident rate worldwide (WHO, 2011).

According to the report, driving under the influence of alcohol accounts for 70 per cent of accident fatalities in India. The increase in number of vehicles from 82 lakh (8.2 million) in 2007 to 1.6 crore (16 million) in 2012 without appreciable change in the road infrastructure is also believed to the reason for most accidents (International Journal of Research in Management and Technology, 2013).

Road accidents in Tamil Nadu, a state in South India, are among the highest in India. In 2013, the state recorded 15,563 fatalities and in 2012, 14,504 recorded accidents, the highest for any state in India. The state also topped the list of most accidents in country for all previous ten years from 2002 to 2012 (Indian journal of orthopedics, 2014).

External fixators are used to manage open fractures with soft tissue damage. They provide stable support for severe comminuted fractures while permitting active treatment of damaged soft tissues. Complicated fractures of the humerous, forearm, femur, tibia and pelvis are managed with external skeletal fixators (Holmes&brown, 2005).

External fixators may be unilateral, bilateral or circular depending on the anatomical site and the problem being managed (Holmes etal, 2005). Skeletal pins have been used to treat fractures since before the 1800s (Patterson 2005), and the use of external fixation devices has been in practice since the 1920s. However, there has been considerable development in the field with external fixation now considered a key tool in orthopedic management (Santy, 2000).

Skeletal external fixation involves the surgical application of apparatus attached to percutaneous pins or wires that penetrate the bone and are attached to an external frame. External devices which hold wires or pins that are placed through one or both cortices of bone in order to hold the position of a fracture in proper alignment. These devices allow easy access to wounds, adjustment during the course of healing, and more functional use of the limbs involved (National Library of Medicine USA, 2011).

Each wire or pin penetrates skin and soft tissue. Percutaneous wounds are formed at the interface between the pin or wire and the skin at its site of penetration. These wounds are sometimes known as ‘pin tracks’, ‘pin tracts’ or ‘percutaneous pin sites’, although the majority of the literature uses the term ‘pin sites’. For the sake of clarity the terms ‘pin’, ‘pin site’ and ‘pin site wound’ will be used from this point forward to include all types of skeletal pin or wire Each wire or pin penetrates skin and soft tissue(Royal College of Nursing(RCN) guidance of pin site care, 2010).

Pin site infections are one of the most common and most feared complications associated with the use of skeletal pins, wires and external fixation (W-Dahl and Toksvig-Larsen, 2004).

A common definition of pin site infection has not been accepted yet, which creates a problem in determining the prevalence of infection. Inflammation was defined as the presence of redness around the portal, pain, or discharge from the wound margin. Colonization was defined as redness and discharge from the wound (Lee-Smith, 2001).

Pin Site Infection (PSI) has been described as so common that "it seems reasonable to consider it unavoidable". Infection can range from local soft tissue infection and cellulitis to osteomyelitis, bacterial endocarditis and septic arthritis, in severe cases this may progress to septicemia. In many cases minor infection can be remedied with increased pin site care and antibiotic therapy, whereas major infection requires prolonged treatment with systemic antibiotics and often the removal of pins (Jennie walker, 2012).

Pin site infection commonly occurs in the presence of Staphylococcus aureus and often responds readily to oral antibiotics. Deeper infection, however, may persist despite the use of parenteral antibiotics and may subsequently affect the stability of the fixation (Davies et al2005, Patterson, 2005).

The presence of infection at the pin site is painful and delays patient mobilization. Infection may also cause severe complications(Davis 2003, W-Dahl *et al* 2003) including osteomyelitis, delayed fracture healing, non-union, loss of fracture alignment and systemic infection (McKenzie 1999, Temple and Santy 2004), which may ultimately result in 'failed' orthopedic surgery or long-term pain and disability (Davis, 2003).

The positive cultures were 50% higher in proximal pin sites than in distal pin sites. (W-Dahl *et al,* 2003) Similarly, pin sites nearer joints are noted as being particularly prone to infection because they are subject to greater movement (Davies etal 2005). Furthermore, several authors have identified correlations between rate of infection and age, smoking, multiple pathologies, low serum protein, patient personal hygiene and patient concordance (Sproles 1985, Wallis 1991, Sims and Saleh 1996, Ward 1998). Excess pin site motion may also be associated with an increased risk of infection (Bernardo, 2001).

Pin site infection is documented to be as high as 85% in the Western countries. 5 and 71.4% including major and minor infection are respectively reported in India (Indian journal of orthopaedics, 2008).

Pin-site reaction usually subsides within three days (Holmes al, 2005). The presence of the pin prevents total healing of the soft tissues and it is essential to maintain an environment that minimizes the risk of infection (Davies *et al* 2005). On this basis, it is clear that pin site care and management techniques should be evidence-based, rather than founded on anecdotal evidence or personal preference (Temple and Santy 2004).

A cleansing solution is necessary to remove drainage around pin site. Keeping pin sites free of drainage and clean allows easier monitoring. A cleaning solution is necessary for the removal of crusting to allow for adequate drainage. Loosely wrapping a gauze bandage around pin site daily will provide a protective barrier without blocking the flow of drainage.

The cleaning solutions used for cleaning skeletal pin sites include hydrogen peroxide, povidone iodine solution, normal saline, soap and water, sterile water and chlorhexidine gluconate (Jones Walton, 1991).

Hydrogen peroxide (H2O2) is the simplest peroxide (a compound with an oxygen-oxygen single bond). It is also a strong oxidizer. Hydrogen peroxide is a clear liquid, slightly more viscous than water. In dilute solution, it appears colorless. Due to its oxidizing properties, hydrogen peroxide is often used as a bleach or cleaning agent. The oxidizing capacity of hydrogen peroxide is so strong that it is considered a highly reactive oxygen species. Concentrated hydrogen peroxide, or 'high-test peroxide', is therefore used as a propellant in rocketry. Organisms also naturally produce hydrogen peroxide as a by-product of oxidative metabolism. Consequently, nearly all living things (specifically, all obligate and facultative aerobes) possess enzymes known as catalase peroxides, which harmlessly and catalytically decompose low concentrations of hydrogen peroxide to water and oxygen.

Povidone-iodine is a broad spectrum antiseptic for topical application in the treatment and prevention of infection in wounds. May be used in first aid for minor cuts, grazes, burns, abrasions and blisters.

1.1NEED FOR THE STUDY

“Nursing is a service to humanity, devotion to others without hope of any sort of reward but than for the love of god”

India is passing through a major socio demographic, epidemiologic, technological, and media transition. 19.9 road fatalities per 100000 inhabitants per year, 211.8 road fatalities per 100000 motor vehicles in 2011 (WHO, 2011).

Health scenario has also altered. India had 58,863,000 vehicles in 2002, 197 times greater than 1951, with 71% two wheelers. The unprecedented increase in vehicles without road safety norms has lead to tremendous increase in road traffic accidents. The national average of deaths due to road traffic injuries is about 800/lac of population (WHO, 2002).

Tamil Nadu has reported the maximum number of road accidents (67,757) accounting for 15.4% of such accidents in the country. Although Maharashtra had the highest number of registered vehicles in the country, the highest number of deaths due to road accidents during the years were reported in Tamil Nadu (Indian Journal of Orthopaedics and Traumatology, 2013).

The number of people killed in road accidents reported in Madurai and a few extension colonies had risen by at least 40 per cent in 2008 (January-October) when compared with the numbers during the corresponding period in 2007 and 2006. According to the data available with the police department, 119 persons were killed in the city alone between January and October in 2008 as against 85 persons killed during the corresponding period the previous year (2007). In the first 10 months of 2006, a total number of 107 persons were killed on the roads. In 2007, the highest number of fatal cases was reported in October with 15, followed by 14 in June and 10 in March (The Hindu, November, 2008).

If the pin care has been properly done, the skin will rapidly heal around the pins and the discharge stops. It is therefore important to identify pin site infection earlier. Special care of the fixator and pin tracts are necessary to prevent infection and unsuccessful healing of the fracture. If the pin care has been properly done, the skin

will rapidly heal around the pins and the discharge stops. It is therefore important to identify pin site infection earlier.

External fixation is now an established treatment modality, and is extensively used to treat fractures either alone, or in combination with internal fixation (where screws and plates are used to hold bone fragments together beneath a surgical wound), traction or plaster cast (Blaiser 1997).

External fixation wires and pins are colonized with bacteria, usually Staphylococcus aureus and Staphylococcus epidermidis and reported 74.8% of screw tips cultured positive at removal, with a higher rate of gram-positive bacteria (90.6% S. epidermidis and 37.5% S. aureus*)* compared with gram-negative bacteria (9.4% Escherichia coli*)*.The incidence of chronic osteomyelitis, after external fixation, has been reported to be 0% to 4%. The same gram-positive bacteria species associated with pin tract infection often have been found in cultures of chronic osteomyelitis (Orthopedics journal for evidence of pin site care, 2007).

Pin tract infection is the most significant complication associated with the use of external fixation and has been reported to occur in up to 63% of pins. This high infection rate has been attributed to the conduit that the pins provide between the skin and underlying soft tissue and bone. Pins located in areas with considerable soft tissue should be considered at greater risk for infection. (Orthopaedics journal, 2006).

Infection is undesirable as it can lead to failure of fixation with consequent loss of alignment of the fracture. It can also lead to osteomyelitis (inflammation of bone due to infection) and systemic infection, which may be both costly and difficult to treat. Therefore, external fixation was frequently criticized during the ensuing

century (Sisk 1983), but its advantages, namely early mobilization, axial loading of the fracture (along the normal line of load for the limb), easy observation of the limb, and access to the skin for wound care, have led to its continued use and development (Behrens 1988).

Infections are considered to be one of the most serious concerns that health professionals and patient's have to deal on everyday basis. Pin site infection is the major complication of external fixation of fractures. The rates of infection range from 0.5% to 30%. Skeletal pins are foreign bodies introduced into the bone while remaining in contact with the external environment and therefore have high risk of contamination as they may have to be in position for many weeks. Seventy-one percent of the population audited developed infection. Femoral fixators had the highest incidence rate (86.5%) (Journal of orthopaedics surgery, 2012).

The care of pin sites is mainly prophylactic and aims to prevent or minimize infection, and reduce the risk of skeletal pin reactions. It is also suggested that while physiological success is important consideration must also be given to the psychosocial impact of wearing the device and its potential effect on compliance and outcomes.

Pin-site care is one important part of the treatment by external fixation and includes the care of the wounds, where the pins and/or wires have been inserted, from the theatre dressing until the wounds are healed. The purpose of pin-site care is to prevent pin-site infections. Pin-site care includes different factors such as theatre dressing, frequency of pin-site care, cleansing agent, removal of scab/crust, and dressing (Annette W-Dahl etal, 2009).

A survey conducted among the members of the National Association of Orthopedic nurses and found that hydrogen peroxide was used by the majority (over 91%) of nurses (Jones Walton, 2001).

Daily hydrogen peroxide cleaning for two weeks, then washing with soap and water reduces the pin site complication rate (William C Oppenheim et al., 2010).

A study conducted among the patients with pin site infection found that betadine was effective in treating cases. (Diane R. Eckhouse – Ekeberg et al., 2005).

The orthopaedic department is situated at Anna bus stand, Madurai. There are 480 beds in orthopaedic ward and nearly 45 new cases per month are admitted with external fixator. The present study proposes to determine the effectiveness of hydrogen peroxide dressing and betadine dressing on pin site infection among patients with external skeletal fixators.

1.2 STATEMENT OF THE PROBLEM

"A study to compare the effectiveness of Hydrogen peroxide dressing versus Betadine dressing on pin site infection among patients with external skeletal fixators in orthopaedic ward at Government Rajaji Hospital, Madurai-20.

1.3 OBJECTIVES OF THE STUDY

- To assess the level of pin site infection among patients with external skeletal fixators in orthopaedic ward at Government Rajaji Hospital, Madurai-20.
- To evaluate the effectiveness of hydrogen peroxide dressing in experimental group I and betadine dressing in experimental group II.
- To compare the effectiveness between hydrogen peroxide dressing in experimental group I and Betadine dressing in experimental group II.

- ❖ To associate the level of pin site infection among experimental group I and group II patients with external skeletal fixator with their selected socio demographic variables.

1.4 HYPOTHESES

H_1: The mean post assessment scores of pin site infection among experimental group I and group II will be significantly lower than the mean pre assessment scores of the experimental group I and group II.

H2: There is a significant difference between the level of pin site infection for experimental group I and group II.

H_3: There is a significant association between the level of pin site infection among experimental group I and group II patients with their selected socio demographic variables.

1.5 OPERATIONAL DEFINITION

1. **Effectiveness:** In this study it refers to the outcome of the hydrogen peroxide dressing and betadine dressing on pin site infection among patients with external skeletal fixators which was measured through Checkett's and Otter burn's grading system.
2. **Hydrogen Peroxide Dressing:** In this study it refers to the cleansing of pin site with 3% of hydrogen peroxide solution once a day, followed by application of dry gauze. In this study, subjects who received hydrogen peroxide dressing at pin site were included in the experimental group I.
3. **Betadine Dressing:** In this study it refers to the cleansing of pin site with 5% betadine solution once a day, followed by application of betadine soaked gauze. In this study, subjects who received betadine dressing at pin site were included in the experimental group II.

4. **Pin site Infection:** In this study it refers to varying degree of inflammation of skin changes around the external fixators site and graded through I-IV as measured through Checkett's and Otter burn's grading system.
5. **External Skeletal Fixators:** In this study it refers to a rigid external frame attached to percutaneous metal pins inserted through the soft tissue and bone, is used to manage complex fractures.
6. **Patients with External Skeletal Fixators**: In this study it refers to the patients who had external skeletal fixators were admitted in orthopaedic ward at Government Rajaji Hospital, Madurai-20.

1.6 ASSUMPTION

This study assumed that: -

1. Patients who have external skeletal fixators prone to get infection at pin site without proper care.
2. Patients with external skeletal fixators have varying level of pin site infection.
3. Hydrogen peroxide and betadine helps to reduce the pin site infection.

1.7 DELIMITATION

- Patients between the age group of 18-50 years.
- Patients who are with external skeletal fixators with Grade I-IV infection.
- The sample size is limited to 60 subjects.
- The study period is limited to 4 -6weeks.

1.8 PROJECTED OUTCOME

- ❖ The study would help to identify the level of pin site infection among patients with external fixators.
- ❖ Hydrogen peroxide dressing and Betadine dressing help to treat pin site infection among patients with external fixators.

Review of Literature

CHAPTER - II

REVIEW OF LITERATURE

Review of literature is a key step for research process. It refers to an extensive exhaustive and systematic examination of the publications relevant to the research project.

According to Polit and Hungler (1999) researcher almost never conduct a study in an intellectual vacuum, their studies are undertaken within the context of an existing base of knowledge. Researchers generally undertake a literature review to familiarize them about the topic under study.

This chapter deals with the selected studies, which are related to the objectives of the proposed study. A review of research and non-research literature relevant to the study was undertaken, which helped the investigator to develop deeper insight into the problem and gain information on what has been done in the past.

PART - I

REVIEW OF LITERATURE

2.1 Literature related to external skeletal fixators.

2.2 Literature related to pin site care.

2.3 Literature related to pin site infection

PART - II

CONCEPTUAL FRAME WORK

PART-1

2.1 LITERATURE RELATED TO EXTERNAL SKELETAL FIXATOR

Telmo Ramos.et.al., (2013) conducted a prospective observational study in 39 consecutive patients with isolated fractures treated with the Ilizarov technique were for one year in Sweden. This study is depending on the type of fracture, 4 or 5 rings were used, in some cases with additional foot extension. Unrestricted weight-bearing was allowed in all cases. Pre- and post-operatively conventional radiographs, post-operative pain assessment and complications were evaluated. No patient developed compartment syndrome or deep venous thrombosis. Pin site infections were frequent, but they were mostly superficial and were treated with antibiotics and/or the removal of isolated pins. Two patients required debridement. One of them had a deep infection and developed a residual deformity which was corrected and healed after re-operation. Another patient had a severe residual deformity. The fixator was removed after a median period of 16 weeks (range 11–30). The radiological results were poor in 5 patients but the overall self-appraisal showed satisfactory results in 36 patients. The Ilizarov method allowed early definitive treatment with a low complication rate and a good clinical outcome.

Wang CQ.et.al., (2008) conducted a case-clinical studies on the applicator of external fixator in the open tibia and fibula fractured patients with Seventy-three patients multiple trauma were reviewed in the study. According to the surgical methods for tibia and fibula fractures, the patients with severe multiple injuries were divided into 2 groups.42 patients in the treatment group, including 31 males and 11 females, with an average age of 40years,31 patients in the control group, including 22 males and 9 females, with an average age of 42 years. The patients in treatment group were treated urgently with debridement, and fixation with external fixator, and

patients in control group were treated urgently with debridement, calcaneal traction or gypsum external fixation. The incidence of wound infection rate, wound healing time, and fracture healing time between the 2 groups was compared. The incidence rate and mortality of complications had significant differences between the 2 groups, those in the treatment group were lower than those in the control group ($P < 0.05$). There were significant decreases in the infection rate and wound healing time in the treatment group. External fixation for severe multiple injuries with open tibia and fibula fracture has been proved to be good, which can significantly reduce the mortality and incidence rate of complications and wound infection rate, promote wound healing.

Chen XL. et.al., (2008) conducted the case-control studies on external fixator for the treatment of comminuted distal radius fractures in senile. 74 senile patients (82 sides) with comminuted distal radius fractures were divided into external fixation group (34 cases 38 sides, 27 males and 7 females, with an average of 70.05 +/- 3.70 years) and small splint fixation group (40 cases 44 sides, 29 males and 11 females, with an average of 70.30 +/- 3.48 years). The loss of volar tilting angle and ulnar inclination angle after reduction and the function scores of carpal joint after removing the fixators were compared. One week after surgery, there was loss of volar tilting angle and ulnar inclination in small splint fixation ($P < 0.01$), and one month after removing the external fixator, the loss of angle was more obvious ($P < 0.01$); while the loss of angle in external fixation group was not significant ($P > 0.05$). After one month of removing the fixation, the functional score of wrist joint in external fixation group was obviously higher than that of the small splint fixation group ($P < 0.05$).The external fixator can be adopted to treat comminuted distal radius fractures in senile, which is able to decrease the reduction loss and helpful to functional recovery.

Mohammed jai sayyad. (2008) conducted a retrospective study in taylor spatial frame in the treatment of open tibial shaft fractures in Saudi Arabia. Nineteen male patients with open tibial fractures were included. Of these fractures, 10 were Gustilo Type II, five were Gustilo Type IIIA (two had delayed primary closure and three had split thickness skin grafting), and four were Gustilo Type IIIB (all had rotational flaps). Twelve of our patients presented immediately to the emergency room, and the remaining seven cases presented at a mean of 3 months (range, 2.2-4.5 months) after the initial injury. The fractures were located in proximal third (n=1), proximal/middle junction (n=2), middle third (n=3), middle/distal junction (n=8), distal third (n=3), and segmental fractures (n=2). Patients were of an average age of 26 years (range, 6-45years). Mean duration of follow-up was 3.5 years. All fractures healed over a mean of 25 weeks (range, 9-46 weeks). All were able to participate in the activities of daily living without any difficulty and most were involved in sports during the last follow-up. Postoperative complications included pin tract infection in 12 patients. The TSF is an effective definitive method of open tibial fracture care with the advantage of early mobilization, ease of soft tissue management through gradual fracture reduction, and the ability to postoperatively manipulate the fracture into excellent alignment.

Handoll HHG .et.al (2008) conducted External fixation versus conservative treatment for distal radial fractures in adults Fifteen heterogeneous trials, involving 1022 adults with dorsally displaced and potentially or evidently unstable distal radial fractures, were included. While all trials compared external fixation versus plaster cast immobilization, there was considerable variation especially in terms of patient characteristics and interventions. Methodological weaknesses among these trials included lack of allocation concealment and inadequate outcome assessment. External

fixation maintained reduced fracture positions (redisplacement requiring secondary treatment7/356 versus 51/338 (data from 9 trials); relative risk 0.17, 95%confidence interval 0.09 to 0.32) and prevented late collapse and malunion compared with plaster cast immobilization. There was insufficient evidence to confirm a superior overall functional or clinical result for the external fixation group. External fixation was associated with a high number of complications, such as pin-track infection, but many of these were minor. Probably, some complications could have been avoided using a different surgical technique for pin insertion. There was insufficient evidence to establish a difference between the two groups in serious complications such as reflex sympathetic dystrophy: 25/384 versus 17/347 (data from 11 trials); relative risk 1.31, 95% confidence interval 0.74 to 2.32.

Nabil A. Ebraheim. et.al., (2007) conducted A retrospective review of 64 patients (M 36, F 28,average age 55 years) with 29 two-part fractures and35 three-part fractures of the proximal humerous was conducted at a Level 1 Trauma Center. All fractures were managed with the mini external fixator. Open reduction was performed in 11 cases, closed reduction in 53. The average follow-up was 21 months (range, 12-39). The final outcome, evaluated according to Neer's scoring system, was excellent in 63.4%of patients, good in 18.8%, fair in 12.7%, and poor in5.1%. By 9 weeks, 85% of the fractures were healed and 97% by 12 weeks. Complications included nonunion, superficial infection and deep infection, in two cases for each. Bicipital tendonitis occurred in five cases and secondary displacement of the fragments in four others. The small diameter of the pins used in the mini external fixator has the advantage of allowing the orthopedic surgeon to fix the fracture in more than one plane and achieve an early acceptable range of motion. This technique appears attractive especially in

poly trauma patients, as the procedure can be performed in the supine position and causes no additional blood loss.

Predrag Stojiljkovic. (2007) conducted a study to external fixation in primary treatment of the femoral shaft fracture in vranje. External fixation has not been widely used for femoral shaft fractures. External fixation is generally reserved for severe open fractures and for initial stabilization of fractures in poly trauma patients. From January 1, 2000 to December 31, 2005, 23 patients with 24femoral shaft fractures were treated by external fixator Mitkovic. The series included 19 (83%) men and 4 (17%) women, mean age 35.9 years. All patients were victims of high-energy trauma: 16 (70%) traffic accidents, 3 (13%) falls from height and 4 (17%) firearm wounds. Fourteen (61%) patients had multiple injuries. One patient had bilateral femoral shaft fractures and three patients had another fracture in the lower extremity. Fourteen (58.3%) fractures were open. Sixteen fractures (66.6%) had comminution. Twenty-one fractures (87.5%) healed without complication including five fractures where external fixation was converted into internal one. The meantime to union was 6.5 (4-9) months. There were two pin-track infections (8.3%),two deep infections (8.3%), and only one nonunion (4.1%). The femur length was equal to the healthy side in 19 cases, and was shorter by 1-2 cm in 5 cases. Mean active knee flexion was 90° (40-130°). Knee flexion was more than 110° in 9(39.1%) patients. External fixation by the use of Mitkovic external fixator is a useful technique for the stabilization of severe open and close highly comminuted femoral shaft fractures until union. It is also a safe procedure to achieve temporary rigid stabilization of femur fracture in too critical poly trauma patients before delayed internal fixation (damage control orthopedics).

A. Moroni, F. Vannini.et.al., (2004) conducted a comparative in fracture treatment with plaster cast vs external fixation in Italy. Forty elderly female osteoporotic wrist fracture patients were randomized to be treated with either plaster cast (Group A) or external fixation (Group B). Bone mineral density less than –2.5 T-score was among the inclusion criteria. In Group A, four re displacements occurred, whereas in Group B there were one ($p = 0.005$). Horesh score was higher in Group B ($p < 0.006$) than in Group A. Volarangle deformity ($p < 0.0005$) and radial angle deformity ($p = 0.008$) were lower in Group B. This study shows that external fixation improves stability in elderly osteoporotic wrist fracture patients.

Madeline. et.al., (2003) conducted a comparative study in monolateral and circular external fixators of unstable diaphyseal tibial fracture in children in Philadelphia. Forty six tibial fracture in 44children were treated by external fixation were retrospectively identified. Twenty nine fractures were treated with monolateral fixation and 16 were treated with circular fixation. External fixators were left in place for a mean of 13.7weeks.elven significant complication occurred. Loss of reduction necessitating return to the operating room occurred in four patients (13%) and malunion occurred in additional patient with monolateral fixator and no patient with a circular fixator development of misalignment.

2.2 LITERATURE RELATED TO PIN SITE CARE:

Anne Lethaby. et.al., (2013) conducted a randomized controlled trials (RCTs) that compared the effect on infection and other complication rates of different methods of cleansing or dressing orthopaedic percutaneous pin sites in Newzeland. A total of eleven trials (572 participants) were eligible for inclusion in the review but not all participants contributed data to each comparison. Three trials compared a

cleansing regimen (saline, alcohol, hydrogen peroxide or antibacterial soap) with no cleansing (application of a dry dressing), three trials compared alternative sterile cleansing solutions (saline, alcohol, peroxide, povidone iodine), three trials compared methods of cleansing (one trial compared identical pin site care performed daily or weekly and the two others compared sterile with non sterile techniques), one trial compared daily pin site care with no care and six trials compared different dressings (using different solutions/ointments and dry and impregnated gauze or sponges). One small blinded study of 38 patients found that the risk of pin site infection was significantly reduced with polyhexamethylene biguanide (PHMB) gauze when compared to plain gauze (RR 0.23, 95% CI 0.12 to 0.44) (infection rate of 1% in the PHMB group and 4.5% in the control group) but this study was at high risk of bias as the unit of analysis was observations rather than patients. There were no other statistically significant differences between groups in any of the other trials. The available trial evidence was not extensive, was very heterogeneous and generally of poor quality, so there was insufficient evidence to be able to identify a strategy of pin site care that minimizes infection rates. Adequately-powered randomized trials are required to examine the effects of different pin care regimens, and co-interventions - such as antibiotic use - and other extraneous factors must be controlled in the study designs.

Amathias. (2012) conducted this double blinded RCT recruited 56 participants from a hospital in the Soloman Islands. Consecutive patients who were treated with a standard external fixator (ExFix) in the lower or upper extremity over 2 years were included. They remained inpatients for the duration of their treatment. Antibiotics were given intravenously as soon as possible and continued for a total of 48 hours in all cases. The ExFix constructs normally had 4 pins, 2 proximal and 2

distal and randomization was applied to the pins according to location rather than the patients, resulting in the patients being their own control. The pins were randomized to daily care regimen (removal of crusts, sterile saline irrigation, drying with sterile swabs and sterile dressing pre-soaked in povidone-iodine with dry dressing wrap) or no pin site care. The outcomes included condition of the soft tissue interface, stability of the pins, torsional stability of the pins as determined with a torque meter during their removal, osteolysis on pre-removal radiographs and pin site pain. The authors noted that observed inflammatory changes may not necessarily represent an infection but they stated that microbiological swabs were not reliable in the diagnosis of pin site infection as they may represent normal skin colonization.

Lee. (2012) conducted a randomized trial in Malaysia (38 participants) compared pin site dressings of gauze impregnated with 0.2% polyhexamethylene biguanide with plain gauze (control) in 38 patients scheduled for limb lengthening or deformity correction. Rates of pin site infection were assessed blindly at multiple follow up times (2, 4, 8 and 12 weeks) according to the grading system suggested by Saw 2006. The patients and their caretakers were taught how to perform pin site dressing according to a standard protocol used in the hospital. The dressings appeared identical and both patients and assessors were blinded. The study was designed to look at infection rates per observations rather than per number of pin sites or per patient. The researchers also compared infection rates between the two groups according to infection grades (1, 2 or 3) and between the two groups according to types of bone fixation (wire-skin and pin-skin interfaces).

Yuenyongviwat. (2011) conducted this randomized trial compared the prevalence of pin site infection in 30 patients, in Thailand, with open tibial fracture

requiring external fixation and randomized to either daily pin site dressing with normal saline and 0.5ml of 1% silver sulfadiazine or daily dry dressing with optional removal of dry scale by patients. Assessments were made monthly at an outpatient clinic by an independent but un blinded observer according to the Checketts 1999 classification. After discharge from hospital, patients carried out their own pin site care. Mean duration of follow up was 106 and 109 days.

Cavusoglu. (2009) conducted to compared two different pin site care protocols in 39 patients in Turkey. pin care with daily showering and brushing the pin sites with soap and a toothbrush, and pin site care with daily showering and cleaning crusts with sterile gauze impregnated with iodine solution. All patients had tibial or fibula fractures with Ilizarov external fixation, and used sterile gauze with iodine solution for the first 15 days before continuing with the two separate protocols. No dressing was applied throughout the period. Pin sites were inspected and graded on a scale of 0 to 5 according to a modification of the system of Dahl, described by Gordon 2000, during multiple follow-up periods from 5 to 150 days after surgery, until removal. Grade 1 and 2 infections were categorized as minor and grade 3 or more as major. Systemic antibiotics were prescribed for major infections.

Chan. (2009) conducted a study to compared infection rates in 62 patients in Malaysia (according to a grading system developed in-house) associated with two dressing solutions, diluted povidone-iodine and saline. Participants (46 males and 16 females; children and adults) had undergone distraction osteogenesis (bone lengthening) with external fixators and follow-up was every two weeks for six months. The fixations used were either rigid stainless steel 5 mm diameter half pins

(with one metal-skin interface), or smooth stainless steel 1.8 mm diameter wires (with two interfaces).

R Rose. (2009) conducted a retrospective study was undertaken of 21 patients who were treated with the Ilizarov method for limb length discrepancies in the lower limbs, between 2001 and 2009. All patients received the same protocol for pin site care. The following information was recorded for each infected pin site: location, whether the implant or the wire or half-pin, time of onset of the first pin site infection in each patient and treatment .Results Of the 21 patients, 11 were males and 10 were females with an average of 19.7 years . Sixty-two wires and 95 half-pins were studied. Half-pin infection site was 6.3%; wire site infection was 18.7%. Total pin site infection was 25%. Peri articular pin site infections accounted for 13.6% and diaphyseal infections 1.36%. Of the 21 patients studied, 19 had pin tract infections. Pin tract infections are common with external fixation. The consequences of pin tract infections can range from trivial to severe. Most pin site infections respond well to local pin care and oral antibiotics.

Egol. (2006) recruited 118 adults (mean age 54 years), with 120 distal radial fractures, from two hospitals in the USA, and allocated them to one of three treatment groups one week after surgery daily pin site care with a solution of 1/2 normal saline and 1/2 hydrogen peroxide, weekly application of chlorhexidine-impregnated dressings (Biopatch) by the treating surgeon, or weekly dry dressing changes without pin site care. One of the objectives of the study was to ascertain if the chlorhexidine-impregnated foam disc provided a significant reduction in pin site infection. Surgery and care after surgery was performed according to a specific protocol. All patients received three doses of first-generation cephalosporin antibiotics, one dose before and

two after surgery. Patients undertook pin site care after discharge from hospital. The groups were equivalent at baseline in terms of age or mechanism of injury, but not equivalent in terms of gender. Patients returned to the clinic for weekly evaluation and X-rays were performed every two weeks. It is not clear how infection was identified, although all infections were treated with antibiotics, so antibiotic use can be used as a surrogate outcome for rate of infection. The external fixator was removed at six weeks after surgery (unless infection necessitated earlier removal), and patients were followed up for a minimum of six months. In addition to antibiotic use, patients were assessed weekly for cellulites, erythema, drainage, pin loosening and whether pin removal was necessary before fracture healing due to infection.

Mayukh Bhattacharyya. et.al., (2006) conducted Antibiotics vs an antimicrobial dressing for pin-track infection in London. Twenty-one outpatients with a K-wire fixation for osteoporotic distal radius fracture with established pin-track infection were studied. The first 10 patients were treated with a one-week course of an appropriate antibiotic determined by culture and the rest were treated with Acticoat 7 and Op Site Post-Op dressings. All patients in both groups healed completely, although the healing time was variable. The results from this study confirm that a nano crystalline silver-release dressing may be effective as an alternative to oral antimicrobials in treating postoperative pin-site infection in otherwise uncomplicated patients.

Suresh K. Sharma.et.al., (2006) conducted prospective study in selected wards of Nehru Hospital, PGIMER, Chandigarh during months of January-February 2005. Pin site infection is a most common complication with external skeletal fixation. Infection rates are reported to be as high as 85 per cent, which can be

minimized with meticulous pin site care. However, literature shows that there is high variability and consistency in current pin site care practices. In present study all the pin sites were cared with sterile technique and more than50% of them were cared only one to three times a week. Pin sites were cleansed with povidone iodine (88.47%), normal saline (6.23%), hydrogen peroxide (5.30%), crust was removed (90.65%)and pin sites were covered with Povidone iodine soaked gauze (88.16%), dry gauze (7.17%), bulky dressing (4.67%) without applying any ointment. The pin sites cared more frequently had less infection, which was statistically significant ($p<0.001$). Statistically significant ($p<0.05$) lower pin site infection was found in pin sites where crust was removed and dry gauze was applied. Pin sites cleansed with povidone iodine had higher pin site infection rate (36.97%) than normal saline (30%)and hydrogen peroxide (11.77%) but that was not found statistically significant ($p>0.05$).

Camilo. (2005) was recruited 30 participants (average age 30.5 years) with Ilizarov external fixation apparatus from two hospitals in Brazil. The same team of surgeons inserted the apparatus in both settings. The entry point to the study was the first postoperative follow-up, although the researchers did not state how many days after surgery this was, or whether this was consistent across the sample groups. Patients with signs of active infection in the same limb as the external fixator at the entry point were excluded. Patients in both treatment arms of the study were instructed to apply the wound care protocol after a shower, after washing their hands with clean water and soap. In the control group, the skin around each pin site was cleaned with sterile gauze soaked in 0.9% saline solution to remove all 'dirt'. The sites were then dried with sterile gauze and each site was covered with folded gauze. The experimental group followed the same protocol except that, in addition to all other aspects, gauze soaked in polyvinyl pyrrolidone-iodine (PVPI) was applied to each

site. Observation of each of the pin sites for the presence, or absence, of signs and symptoms of infection took place at each outpatient visit. The presence of purulent exudates (pus) was the criterion adopted for defining the presence of infection. Any drainage fluid or purulent exudates was collected for culture according to a described protocol. Follow-up continued until the fixator was removed (mean of 273 days; range 95 to 276 days).

Grant. (2005) conducted randomized trial in twenty patients (at least 18 years old), who required skeletal pins for acute injury, were recruited from a hospital in Australia. At 72 hours after surgery, participants were randomized to (1) cleansing with normal saline flush and application of soft white paraffin ointment, or (2) twice daily cleansing with normal saline and application of 10% povidone-iodine solution. Both groups underwent cleansing for 14 days, or until discharge, followed by daily care at home until either the pins were removed or infection occurred. The length of time the pins remained in situ ranged from four to 120 days. The number of pin sites per patient ranged from two to 17. Patients managed their own care, and follow-up occurred once a week after discharge from hospital. Prophylactic antibiotics were prescribed either during surgery or immediately after for 83% of patients. Clinical signs of infection (defined as redness, indurations (skin hardening), haemo-serous ooze and pain), and requirement for antibiotic use were measured.

W Dahl. et.al., (2004) conducted a prospective two consecutive case series comparison study in Sweden among 49 patients who were operated on by the hemicallotesis technique with external fixators for knee deformities. 30 were cleansed with chlorhexidine 2mg/ml once per week, 19 were cleansed with normal saline once week, and the result shows that normal saline group had a significantly higher risk for

positive culture that is 0.5% grade II infections in the chlorhexidine group and 3% in the saline group. Chlorhexidine group required significantly fewer antibiotics and had less pain at weeks 6 and 10.

R. Davies. (2004) conducted a prospective study on the care of pin sites with external fixation. Two protocols for the operative technique and care of the pin-site with external fixation were compared prospectively. There was a total of 120 patients with 46 in group A and 74 in group B. Infection was defined as an episode of pain or inflammation at a pin site, accompanied by a discharge which was either positive on bacterial culture or responded to a course of antibiotics. Patients in group B had a lower proportion of infected pin sites ($p = 0.003$) and the time to the first episode of infection was longer ($p < 0.001$). The risk of pin-site infection is lower if attention is paid to avoiding thermal injury and local formation of haematoma during surgery and if after-care includes the use of an alcoholic antiseptic and occlusive pressure dressings. Infection at the pin-sites is commonly encountered with external fixation. Healing is prevented by the presence of the pin. It is necessary to maintain an environment which lessens the risk of infection. To this end, various protocols of care have been introduced but there is no conclusive information to support the use of any one method. We carried out a prospective study on two groups of patients who underwent different protocols for pin insertion and after-care. There were no significant differences between the groups with regard to age, gender, nutritional status or reason for external fixation. Of the 46 patients in group A, 41 had pin-site infections compared with 48 of the 74 patients in group B. This was statistically significant (chi-squared test, $p = 0.003$), rejecting the null hypothesis that there was no difference in the numbers of patients with pin-site infections in the two groups. The difference in the proportions of patients was 0.24 with a 95% confidence interval

between 0.10 and 0.38. The relative risk of a single infection was 37% greater in group A (relative risk 1.37, odds ratio 4.44).

Williams H. (2004) conducted a study to the effectiveness of pin site care for patients with external fixators. The study included two treatment groups, one using 0.9% normal saline and one using 70% alcohol, and a control group which had no cleansing. While the control group had a more favourable outcome than the treatment groups, there is still insufficient evidence from this one study to recommend no cleansing. It is also important to note that the most frequently recommended solution for cleansing pin sites in UK protocols (0.9% normal saline) had the worst outcome, therefore its efficacy in this population may need to be challenged.

Patterson. (2002) conducted a comparative study to determine which of seven methods for caring for skeletal pins resulted in the fewest pin site infection in Harvard vanguard medical associates, United States of America. The protocols were(1) half strength peroxide cleaning and gauze warp (45%), (2) half strength peroxide cleaning and xeroform wrap (9%), (3) saline cleaning and xeroform wraps (26%), (5) antibacterial soap and water cleaning and gauze (38%), (6) antibacterial soap and water cleaning and xeroform gauze (50%) and (7) stable dressing with no pin cleaning (36%). The 92 subjects had an average infection rate of 34% and the 5.27 pins had rate of 20%, thirty patients had stage II infection, two patient(12pins) had stage III infections, and none had deep infection. Result suggests that half strength peroxide cleaning and xeroform dressing were superior to soap and water cleanings.

2.3 LITERATURE RELATED TO PIN SITE INFECTION

Aik Saw. et.al., (2012) conducted rates of pin site infection during distraction osteogenesis based on monthly observations in Department of Orthopaedic Surgery, University Malaysia Medical Center, Kuala Lumpur, Malaysia .Five men and 2 women aged 15 to 35(mean, 23) years underwent distraction osteogenesis for 8 tibias using the Ilizarov ring external fixator or Taylor Spatial Frame. Patients were taught to perform standard daily pin site care at home, and were evaluated monthly for pin site infection by a single observer using a standardized grading system. Results of 1334 observations made on 110 pin/wire sites, there were 83 (6%) pin site infections; 44 (3%) were grade 1 and 39 (3%) were grade 2. The risk of infection was higher at half pin than wire sites. The highest rates occurred in the distal segment.

N. Ferreira.et.al., (2012) conducted Pin tract sepsis Incidence with the use of circular fixators in a limb reconstruction unit Pin site-related problems remain one of the most common complications in the realm of limb reconstructive surgery. Several factors determine the integrity of the bone-pin interface, including the insertion technique, the mechanical forces applied through the frame and the selected pin site care protocol. Pin site complications can be catastrophic as they may lead to failure of the bone-pin interface and, possibly, osteomyelitis. Between July 2008 and July 2011, 111 patients at our Limb Reconstruction Unit were treated with circular external fixators. These patients' records were reviewed with regard to pin site complications, treatment thereof and outcome. Eighty patients met the inclusion and exclusion criteria. Pin site infection was found in 21 patients (26.25%). One patient had a major infection, which required debridement of the pin tract. The remaining 20 cases were all minor infections that responded to local treatment and oral antibiotics. Circular external fixation remains a safe treatment method, with the majority of pin site

complications being of a minor nature that respond readily to local treatment and oral antibiotics.

Antoci.Vet.al., (2008) conducted a study to evaluate the incidence of pin-tract infection (PTI) during limb lengthening using external fixation in 88 patients and the effects of infection on final outcomes and incidence of additional procedures in Department of Orthopaedic Surgery and Rehabilitation, Texas Tech University, USA. The PTI rate was 96.6%. The rate of half-pin site infection was significantly (P<.05) higher in half-pin fixators (100%) than in hybrid fixators (78%). There was a significantly (P<.05) higher incidence of half-pin site infection (78%) than fine-wire site infection (33%). The rate of additional surgeries for treating PTI was higher for half-pin sites than for fine-wire sites. Three (3.4%) of the 88 cases led to chronic osteomyelitis. Careful insertion and a simple, well-defined, excellent pin-care protocol can minimize PTI.

Thomas Petnehazy.et.al., (2007) conducted a study to evaluate the incidence and severity of pin tract infections in a series of pediatric trauma patients in Medical University, Austria between 1998 and 2003. The charts of 30 children between 7-19 years with 37 episodes of external fixation were reviewed. Pin tract infections were graded using the Dahl classification. Bacterial cultures were obtained in case of drainage from the pin site. In 18 (48%) of 37 external fixations, no signs of infection occurred. In the remaining 19 (52%) external fixations, 35 episodes of infection were documented. Only 3 (9%) severe deep infections were noted. The researcher concluded that Pin tract infection occurred in half of the patients who were treated with external fixations.

PART-II
CONCEPTUAL FRAMEWORK

The investigator adopted Modified Imogene King's Goal Attainment Theory (1981) based on the personal & interpersonal systems including interaction, perception, judgment, action, reaction and transaction. The investigator adopted goal attainment as a basic theory for conceptual framework, which is aimed at effectiveness of hydrogen peroxide dressing and betadine dressing on pin site infection. This involves interaction between the researcher and the patients with external skeletal fixator.

Six major concepts describe these phenomena:

Perception

It refers to people's representation of reality. Here the patients perceived the need of dressing on pin site.

Judgment

Judgment is decision which is made. Here the researcher decides to provide dressing on pin site and patient decided to accept in the dressing over the pin site.

Action

This refers to the changes that have to be achieved. The researcher action is to assess the level of pin site infection by checkett's and otter burns grading system and then patients decided to receive the dressing.

Reaction

Reaction helps in setting a mutual goal. In this study the researcher and patients set a mutual goal. Here the mutual goal is plan to reduce the pin site infection.

Interaction

If refers to the verbal and non verbal communication between one individual or between two or more individual who involve goal directed perception. Here the researcher encourages the patients with external fixator to receive the hydrogen peroxide dressing and betadine dressing on pin site infection.

Transaction

This is the achievement of a goal. Here the researchers goal is achievement of the reduction in level of pin site infection and evaluate the effectiveness of hydrogen peroxide dressing and betadine dressing by using checkett's and otter burn's grading system.

Methodology

CHAPTER III

RESEARCH METHODOLOGY

Research methodology is a method to solve research problem systematically. The method used to structure a study, to gather and analyze information in a systemic fashion.

(Polit & Beck, 2011)

Research methodology is a pathway by which the researcher intends to solve the problem systematically. It involves the series of procedures in which the Investigator starts from initial identification of the problem to its final conclusion.

This chapter includes Research approach, research design, variables. Description of setting, population, sample .sample size, sampling technique and criteria for sample selection. It further deals with the development of tool, description of tool, validity, reliability, pilot study and procedure for data collection, plan for data analysis and Ethical consideration.

3.1 RESEARCH APPROACH:

The Researcher adopted Quantitative approach.

3.2 RESEARCH DESIGN

True experimental- comparative study design.

R	Experimental Group I	O_1	X	O_2
	Experimental Group II	O_1	X	O_2

Experimental Group I- Subjects receiving hydrogen peroxide dressing

Experimental Group II- Subjects receiving betadine dressing

R-Random assignment

O_1-Observation before intervention.

O_2-Observation after intervention.

X-Intervention

3.3 RESEARCH VARIABLE

- **Independent variable:** Hydrogen peroxide dressing and Betadine dressing.
- **Dependent variable:** pin site infection.
- **Socio demographic variables**: Age, sex, religion, educational status, Marital status, occupation and income, duration of stay in hospital, locality, dietary habits.

3.4 SETTING OF THE STUDY

Orthopaedic ward at Government Rajaji Hospital, Madurai-20.

3.5 POPULATION

Target population

The target population is patients with external skeletal fixator having pin site infection.

Accessible population

The patients with external skeletal fixators with pin site infection in Orthopaedic ward at Government Rajaji Hospital, Madurai.

3.6 SAMPLE

Patients with external skeletal fixators in orthopaedic ward at Government Rajaji Hospital, Madurai, who fulfill the selection criteria.

3.7 SAMPLE SIZE

Sample size- 60 patients,

Experimental group I -30

Experimental group II-30

3.8 SAMPLING TECHNIQUE

Simple random sampling technique-lottery method.

3.9 CRITERIA FOR SAMPLE SELECTION

Inclusion Criteria

- Subjects with external skeletal fixators with grade I- grade IV infection.
- Subjects between the age group of 18 to 50 years.
- Subjects who were conscious and able to follow instructions.
- Subjects who can speak and understand Tamil.
- Subjects who were willing to participate in this study.
- Both Gender.

Exclusion Criteria

- Subjects with diabetes mellitus and vascular disease.
- Subjects with neuro-muscular disorder.

3.10 DEVELOPMENT AND DESCRIPTION OF THE TOOL

It consists of two sections

SECTION A

Semi structured interview schedule which is prepared by the researcher validated by the experts. It comprises 10 number of items of socio demographic

variables such as age, sex, religion, educational status, Marital status, occupation and income, duration of stay in hospital, locality, dietary habits.

SECTION B

STANDARDIZED TOOL

- Checkett's and Otter burn's grading system to evaluate the pin site infection. It has six grading system with two to three characteristics in each.

Grades of infection	Characteristics
Grade-I	Slight discharge Redness around the pins
Grade-II	Redness of the surrounding skin Pain and tenderness in the soft tissue Discharge of pus
Grade-III	Fail to improve with intensive local fixation can be continued treatment and antibiotics.
Grade-IV	Severe soft tissue involvement · Affecting more than one pin · Associated loosening of the pin
Grade-V	Clinical appearance same as grade-iv · Bone involvement · Radiographs show osteomyelitis
Grade-VI Sequestrum formation within the bone. A persistent sinus develops	Sequestrum formation within the bone · A persistent sinus develops

Scoring Key

GRADE	LEVEL OF INFECTION
0	No infection
I- III	Minor infection
IV-VI	Major infection

3.11 CONTENT VALIDITY

Content validity was obtained from 4 experts in Medical Surgical Nursing department and from Chief Medical Officer in orthopaedic department. Their opinions and valuable suggestions were in corporate in the tool and it was finalized by guide.

3.12 RELIABILITY OF THE TOOL

Reliability of the tool was assessed by using Test- Retest method (r= 1). The reliability test score shows there is a stability and consistency in the tool items. Hence the tool was considered highly reliable to the study.

3.13 PILOT STUDY

The study was conducted after getting the formal permission from Institutional Review board/ Independent Ethical committee of Government Rajaji Hospital, Madurai -20. The Pilot study was conducted in orthopaedic ward at Government Rajaji Hospital, Madurai - 20 from 1.8.14- 7.8.14. The data has been collected from the subjects who were willing to participate in the study and who met the selection criteria and obtained consent form from the subjects. Pre test level of pin site infection was assessed with Checkett's and Otter burn's grading system, 6 samples were selected through simple random sampling technique-lottery method, samples were assigned to both the groups. Experimental Group I received hydrogen peroxide dressing and Experimental Group II received betadine for once a day for 7 days. The post test carried out using the standardized tool (Checkett's and Otter burn's grading system) at 8^{th} day. Then collected data was analyzed and interpreted. The Unpaired "t'' test value of Experimental Group I was.46 and Experimental Group II was 2.8.The value of experimental group II is greater than that of Experimental Group I.

This study indicated that the hydrogen peroxide dressing is more effective than the betadine dressing. This study was feasible to proceed with main study.

3.14 DATA COLLECTION PROCEDURE:

The study was conducted after getting the formal permission from Institutional Review board/ Independent Ethical committee of Government Rajaji Hospital, Madurai-20.The main study was conducted for a period of 5 weeks from 12-08-2014 to 15-09-2014. The Researcher introduced herself to the selected subjects. The data has been collected from the subjects who were willing to participate in the study and who met the selection criteria and obtained consent form from the subjects. Pre test level of pin site infection was assessed with Checkett's and Otter burn's grading system, 16 samples were selected through the simple random sampling technique-lottery method, samples were assigned equally to both the groups. Experimental group I received hydrogen peroxide dressing and Experimental group II received betadine dressing for once a day for 7 days. Post test carried out using the standardized tool (Checkett's and Otter burn's grading system) at 8^{th} day. In the following 2 weeks 16 samples were selected for each weak and same steps of procedure was followed. In last week the remaining 12 samples were selected and 6 for each groups. Same procedure was followed.

3.15 PLAN FOR DATA ANALYSIS

Descriptive statistics:

- The descriptive statistical analysis includes frequency, mean, standard deviation, percentage, was planned for socio demographic variable.

Inferential statistics:

- Wilcoxon signed rank test was planned to find out the effectiveness of hydrogen peroxide dressing in experimental group I and betadine dressing in experimental Group II.
- Mann-Whitney u test was plan for compare the effectiveness between hydrogen peroxide in experimental group I and betadine dressing in experimental Group II.
- Chi square test was planned to find out the association between the level of pin site infection among experimental group I and experimental group II patients with external skeletal fixators with their selected demographic variables.

13.6 ETHICAL CONSIDERATION

The proposed study was conducted after the approval of research committee of the College of Nursing, Madurai medical college, Madurai-20. In order to protect the human rights, ethical committee approval obtained on the month of January 2014 from Ethical committee, Madurai Medical College, Madurai. Both written and verbal consent was obtained from all the study subjects and the data collection was kept confidential. The possible benefit of participating in the study was explained to all the samples. Reassurance was given to the study samples, that confidentiality and privacy was maintained throughout the study.

Data Analysis And Interpretation

CHAPTER - IV

DATA ANALYSIS AND INTERPRETATION

This chapter deals with the analysis of data collected. Statistical procedure enabled the investigator to deduce, summarize, organize, evaluate, interpret and communicate the numeric information. Statistical analysis is a method of rendering quantitative information meaningful and intelligible. In this chapter the data collected, edited, tabulated, analyzed, and interpreted.

SECTION-I

Distribution of samples according to their socio demographic variables.

SECTION-II

Description of patients with external skeletal fixators according to the level of pin site infection for experimental group I and experimental group II.

SECTION-III

Effectiveness of hydrogen peroxide dressing in experimental group I and betadine dressing in experimental group II.

SECTION-IV

Comparison between the effectiveness of hydrogen peroxide dressing in experimental group I and betadine dressing in experimental group II.

SECTION-V

Association of level of pin site infection for experimental group I and experimental Group II with their selected socio demographic data.

SECTION-I

Distribution of samples according to their socio demographic variables.

TABLE -1

Frequency and percentage distribution of socio demographic variables of patients with external fixators

n=60

S. No	Socio demographic variables	Experimental group I (n=30)		Experimental group II (n=30)	
		n	%	n	%
1.	**Age in years:**				
	a)18-25	10	33.3	4	13.3
	b)26-30	3	10	5	16.7
	c)31-40	6	20	12	40
	d)41-50	11	36.7	9	30
2.	**Sex:**				
	a)Male	28	93.3	24	80
	b)Female	2	6.7	6	20
3.	**Religion:**				
	a)Hindu	27	90	29	96.7
	b)Christian	2	6.7	1	3.3
	c)Muslim	1	3.3	0	0
	d)Others	0	0	0	0
4.	**Educational status:**				
	a) Illiterate	6	20	7	23.3
	b)School education	22	73.3	19	63.3
	c)Degree	2	6.7	4	13.3
	d)Others	0	0	0	0
5.	**Marital status:**				
	a)Unmarried	7	23.3	2	6.7
	b)Married	23	76.7	28	93.3
	c)Widow	0	0	0	0
	d)Divorced	0	0	0	0
	e)Separated	0	0	0	0

S. No	Socio demographic variables	Experimental group I (n=30)		Experimental group II (n=30)	
		n	%	n	%
6.	**Occupation:**				
	a)Driver	2	6.7	4	13.3
	b)Former	21	70	20	66.7
	c)Professionals	0	0	0	0
	d)Others	7	23.3	6	20
7.	**Income:**				
	a)1000-1500	4	13.3	1	3.3
	b)1501-2000	8	26.7	9	30
	c)2001-2500	12	40	9	30
	d)2501-3000	6	20	11	36.7
8.	**Duration of stay in hospital:**				
	a)1-2 weeks	4	13.3	4	13.3
	b)2-3 weeks	15	50	15	50
	c)3-4 weeks	6	20	9	30
	d)More than 4 weeks	5	16.7	2	6.7
9.	**Locality**				
	a)Rural	29	96.7	24	80
	b)Urban	1	3.3	6	20
10.	**Dietary habits:**				
	a)Vegetarian	0	0	0	0
	b)Non-vegetarian	30	100	30	100

The above table reveals the back ground data among patients external fixators for the experimental group I and experimental group II .Such as age, sex, religion, educational status, marital status, occupation, income, duration of stay in hospital, locality, dietary habits.

In the view of age, majority of study participants in experimental group I (36.7%) were between 41-50 years, (33.3%) were between 18-25 years, (20%) were between 31-40 years (10%) were between 26-30 years. Majority of study participants in experimental group II (40%) were between 31-40 years, (30%) were between 41-50 years, (16.7%) were between 26-30 years, remaining (13.3%) were between 18-25 years.

With regard to the sex majority of study participants in experimental group I (93.3%) were male and remaining (6.7%) were female. Majority of study participants in experimental group II(80%)were male and remaining (20%) were female.

With regard to the religion, Majority of study participants in experimental group I (90%) were Hindu, (6.7%) were Christian and remaining (3.3%) Muslim, (0%) were others. Majority of study participants in experimental group II(96.7%) were Hindu, (3.3%) were Christian, (0%) were Muslim, (0%) Others.

As far as educational status was concern majority of study participants in experimental group I (73.3%) were School education, (20%) were Illiterate, (6.7%) were Degree, (0%) were others. Majority of study participants in experimental group II (63.3%) were School education, (23.3%) were Illiterate, (13.3%) were Degree, (0%) were others.

With regard to the Marital status, Majority of study participants in experimental group I (76.7%) were Married and remaining (23.3%) were unmarried, (0%) were Widow, Divorced, and Others. Majority of study participants in experimental group II (93.3%) were Married, (6.7%) were Unmarried, (0%) were Widow, Divorced, and Others.

In the view of occupation in experimental group I Majority of study participants (70%) were Former, (23.3%) were others, (6.7%) were Driver, (0%) were Professionals. Majority of study participants in Experimental group II (66.7%) were Former, (20%) were others, (13.3%) were Driver, (0%) were Professionals.

With regard to the Income, Majority of study participants in experimental group I (40%) were Rs.2001-2500, (26.7%) were Rs.1501-2000, (20%) were

Rs.2501-3000, (13.3%) were Rs.1000-1500. Majority of study participants in experimental group II (36.7%) were Rs.2501-3000, (30%) were Rs.2001-2500, (30%) were Rs.1501-2000, and remaining (3.3%) were Rs.1000-1500.

With regard to the duration of stay in hospital, Majority of study participants in experimental group I (50%)were 2-3 weeks, (20%)were 3-4 weeks, (16.7%) were more than 4 weeks, (13.3%) were 1-2 weeks. Majority of study participants in experimental group II (50%) were 2-3 weeks, (30%) were 3-4 weeks, (13.3%) were 1-2 weeks, (6.7%) were more than 4 weeks.

With regard to the Locality, Majority of study participants in experimental group I (96.7%) were rural remaining (3.3%) were Urban. Majority of study participants in experimental group II (80%) were rural and (20%) were urban area.

In the view of Dietary habits, Majority of study participants in experimental group I (100%) were non vegetarian and (0%) were vegetarian, Majority of study participants in experimental group II (100%) were non vegetarian and (0%) were vegetarian.

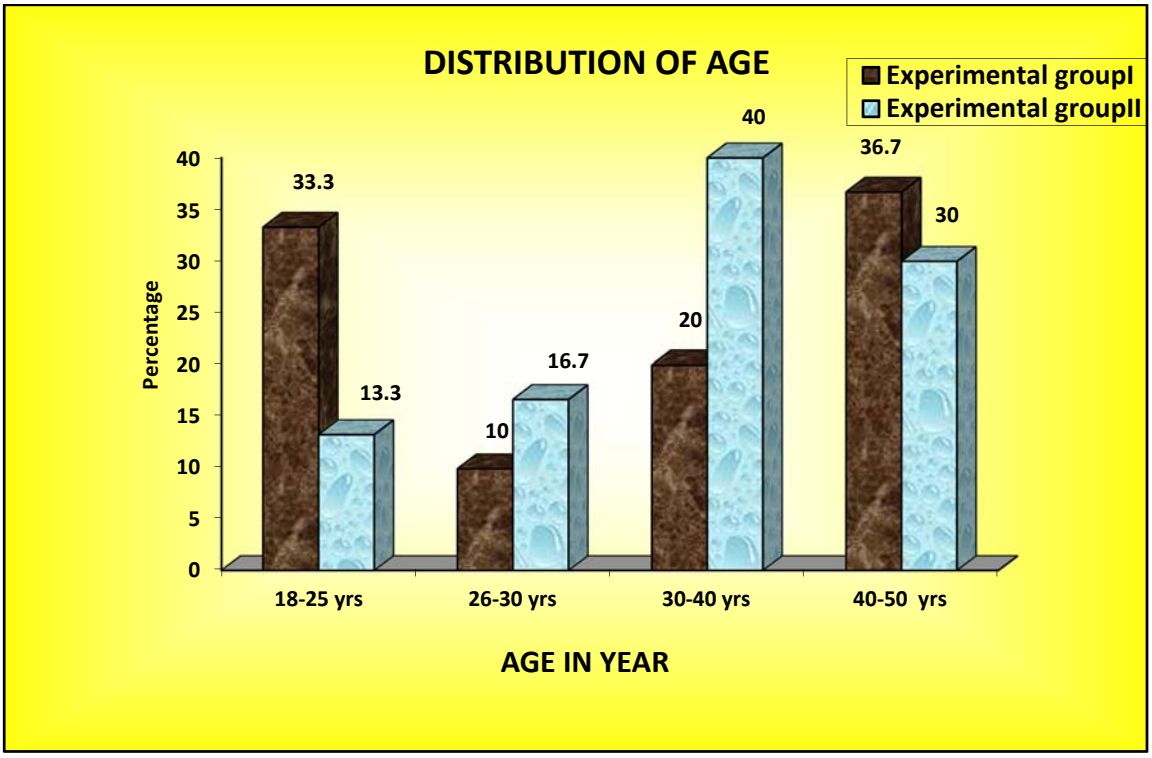

Figure 3. Percentage wise distribution of participants according to their age.

The above multiple bar diagram reveals that the most of the study participants according to their age were (36.7%) between 41-50 years and (40%) between 31-40 years, least of the participants were (10%) were between 26-30 years and (13.3%) were between 18-25 years for experimental group I and experimental group II respectively.

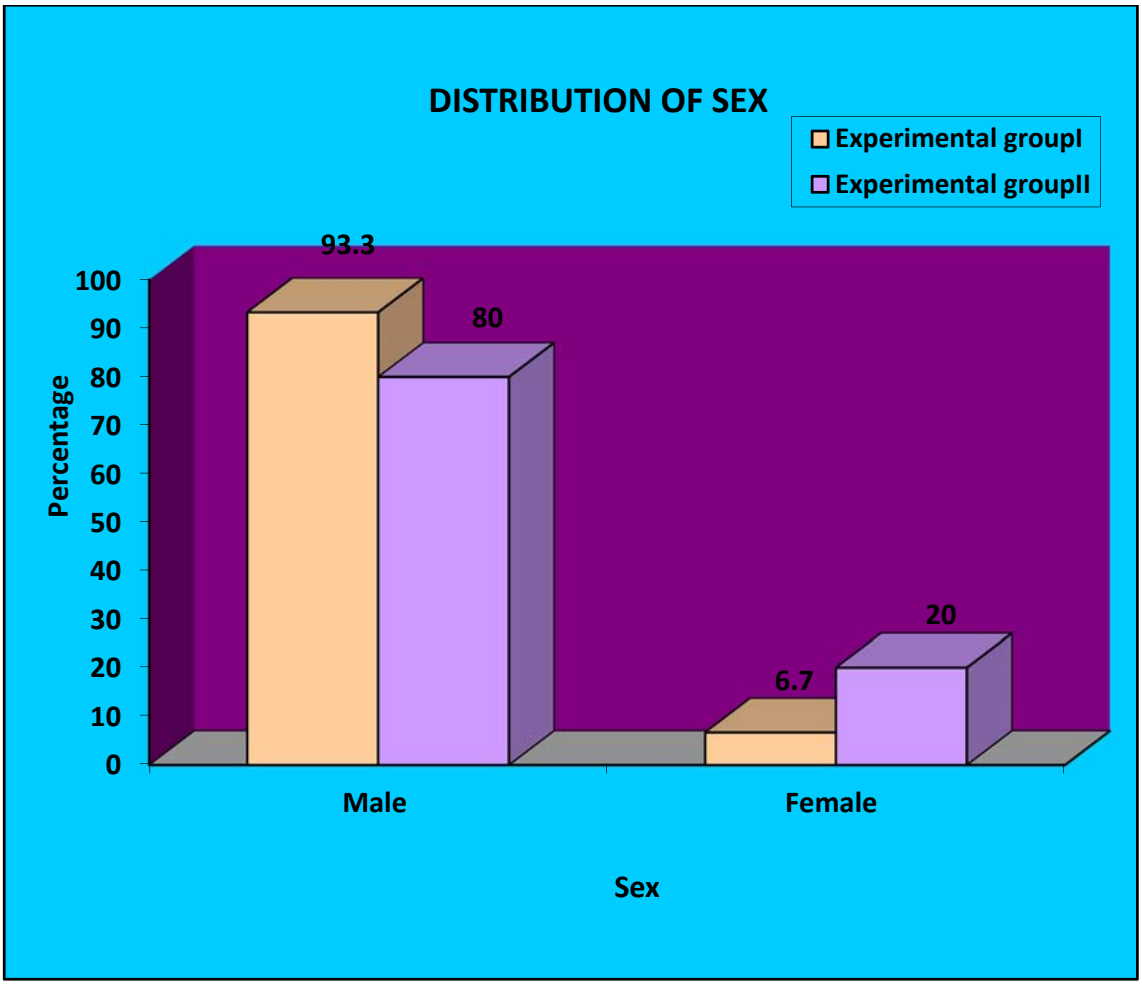

Figure.4 Percentage wise distribution of participants according to their sex.

The above multiple bar diagram reveals that the most of the study participants according to their sex were (93.3%) and (80%) were male and the least of the participants (6.7%) and (20%) were female for experimental group I and experimental group II respectively.

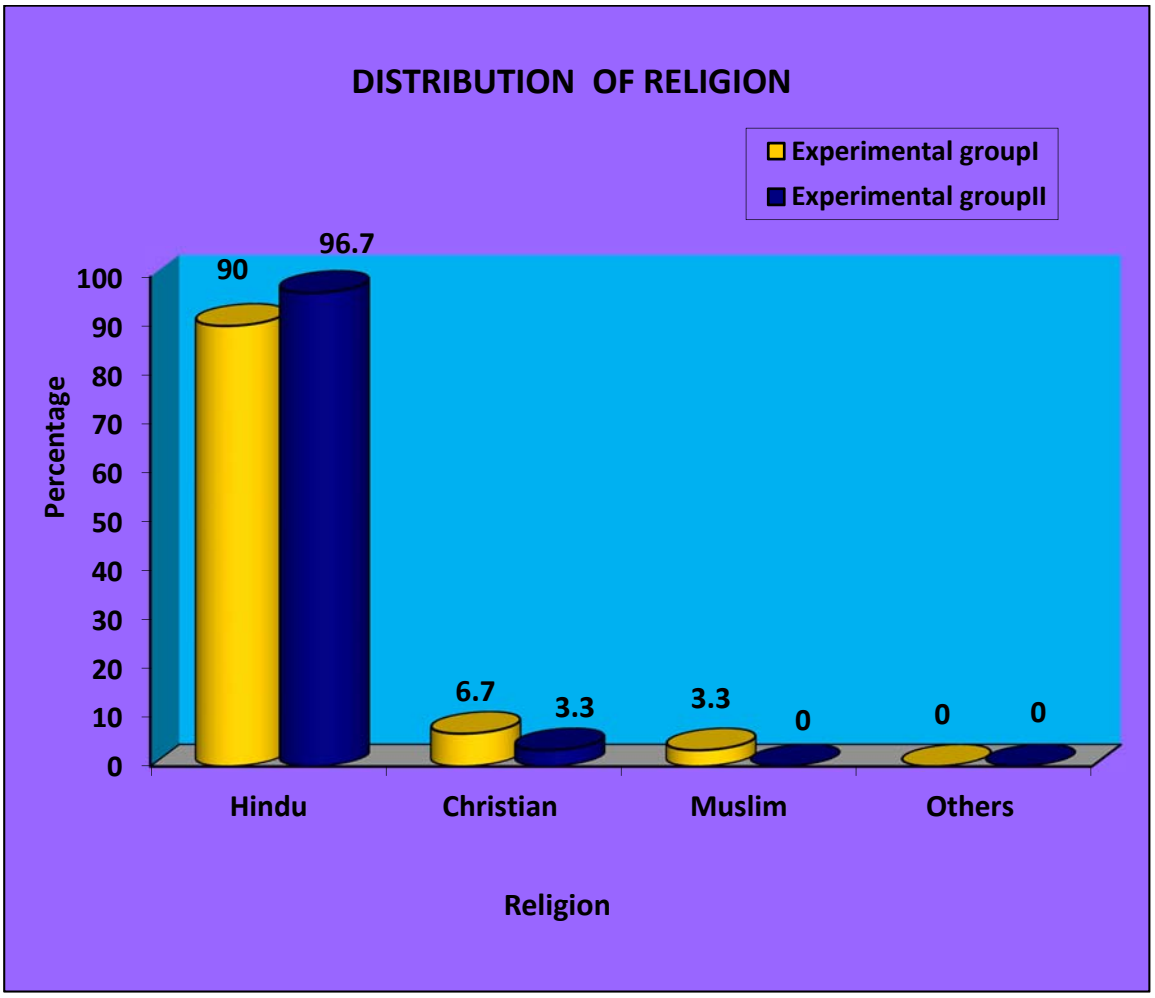

Figure.5 percentage wise distribution of participants according to their religion.

The above multiple cylinder diagram reveals that most of the study participants according to their religion were (90%) and (96.7%) were Hindu, Least of the participants were (3.3%) and (0%) Muslim for experimental group I and experimental group II respectively.

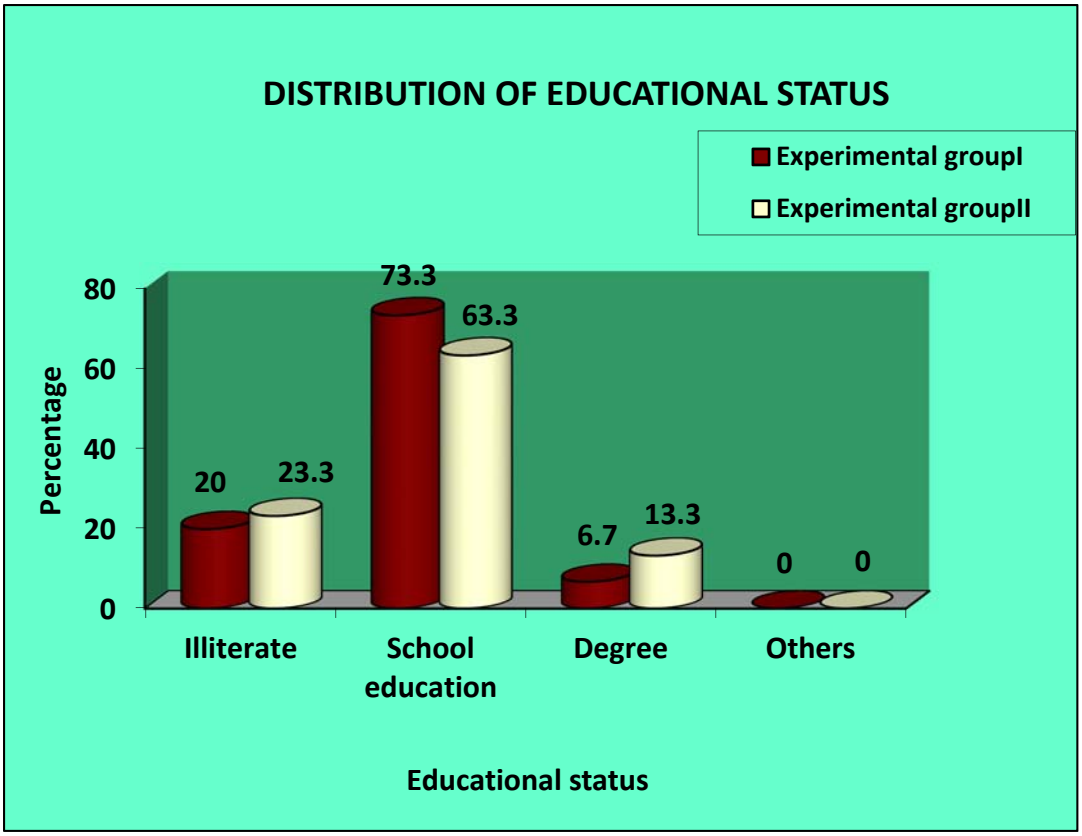

Figure.6 Percentage wise distribution of participants according to their educational status.

The above multiple cylinder diagram reveals that the most of the study participants according to their educational status were (73.3%) and (63.3%) belonging to school education and Least of the study participants (6.7%) and (13.3%) had their degree in experimental group I and experimental group II respectively.

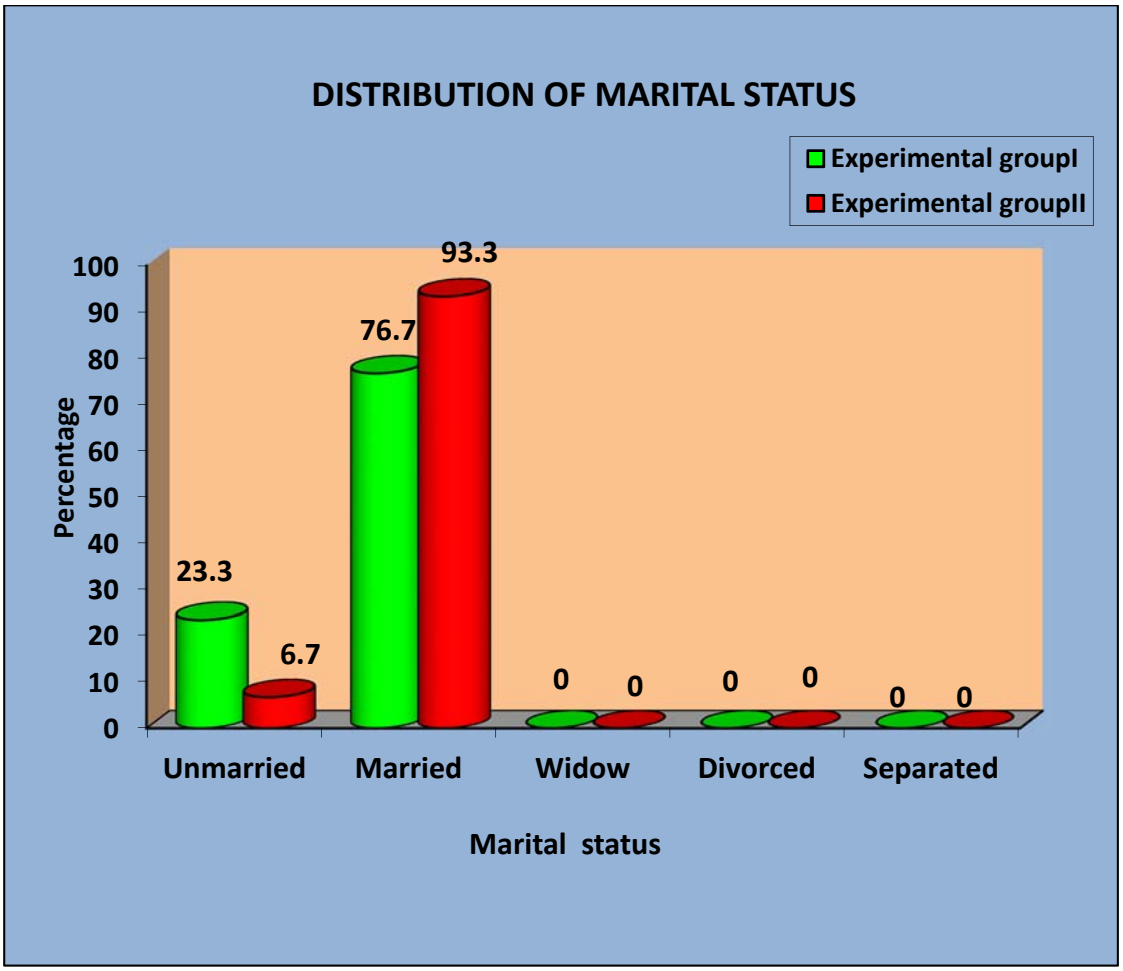

Figure.7 Percentage wise distribution of participants according to their Marital status.

The above multiple cylinder diagram reveals that the most of the study participants according to their marital status (76.7%) and (93.3%) were married and the least of the study participants (23.3%) and (6.7%) were unmarried and none of them were widow, divorced and separated for experimental group I and experimental group II respectively.

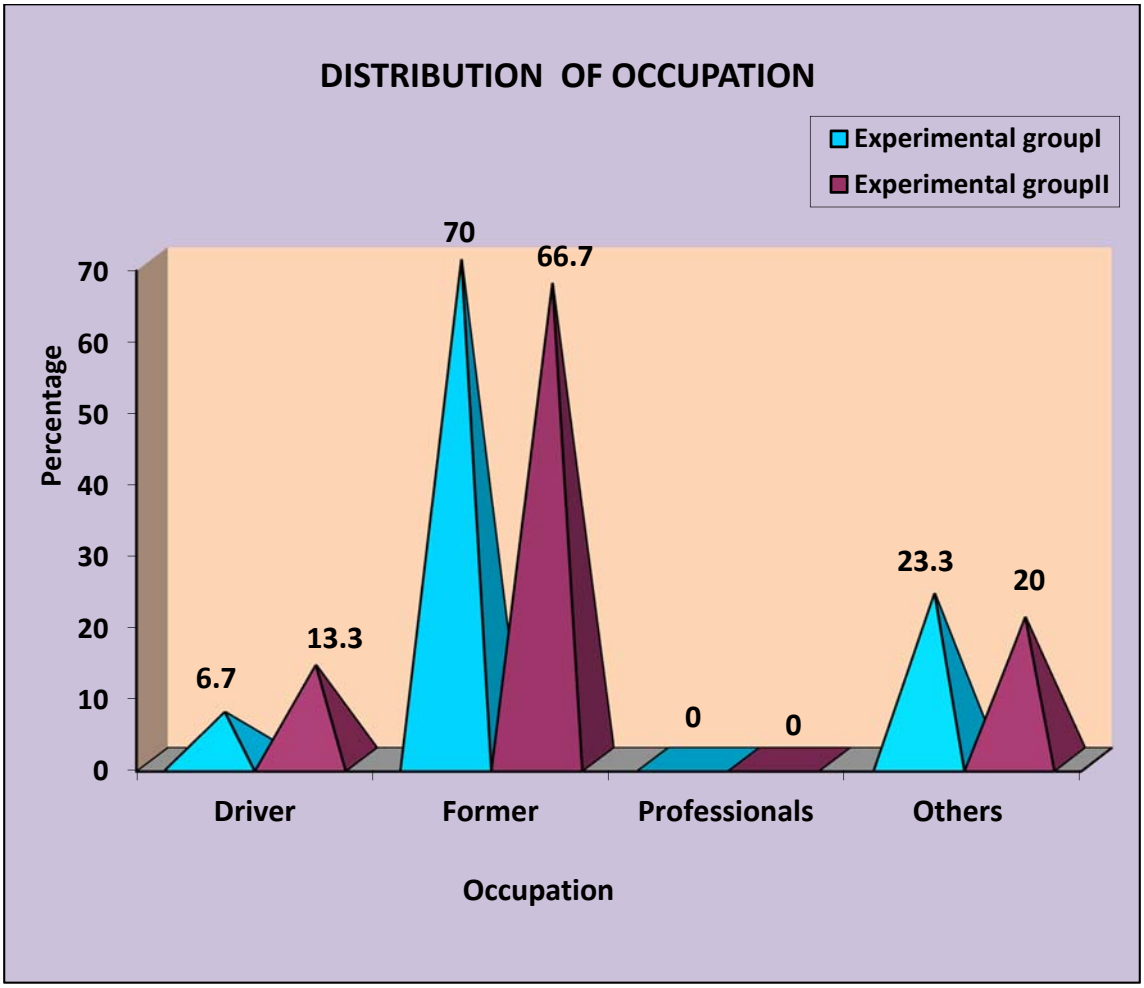

Figure.8 Percentage wise distribution of participants according to their Occupation.

The above Multiple pyramid diagram reveals that the most of the study participants according to their occupational status (70%) and (66.7%) were farmer and least of the study participants (6.7%) and (13.3%) were drivers for experimental group I and experimental group II respectively.

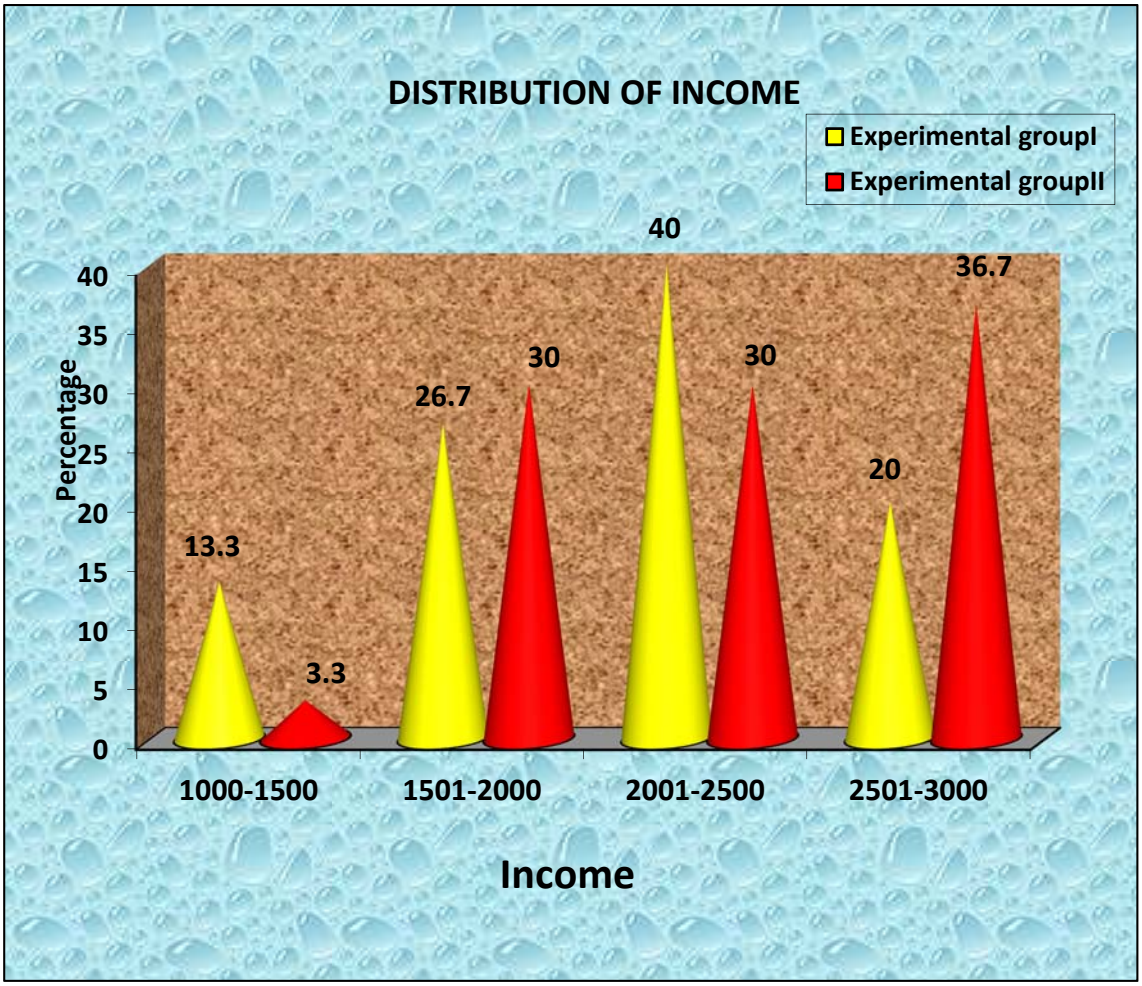

Figure.9 Percentage wise distribution of participants according to their income.

The above multiple cone diagram reveals that the most of the study participants according to their income (40%) with Rs.2001-2500 and (36.7%) with Rs.2501-3000 and least of the study participants (20%) with Rs.2501-3000 and (3.3%) with Rs. 1000 – 1500 for experimental group I and experimental group II respectively and the most lowest (13.3%) with Rs. 1000 – 1500 for experimental group I.

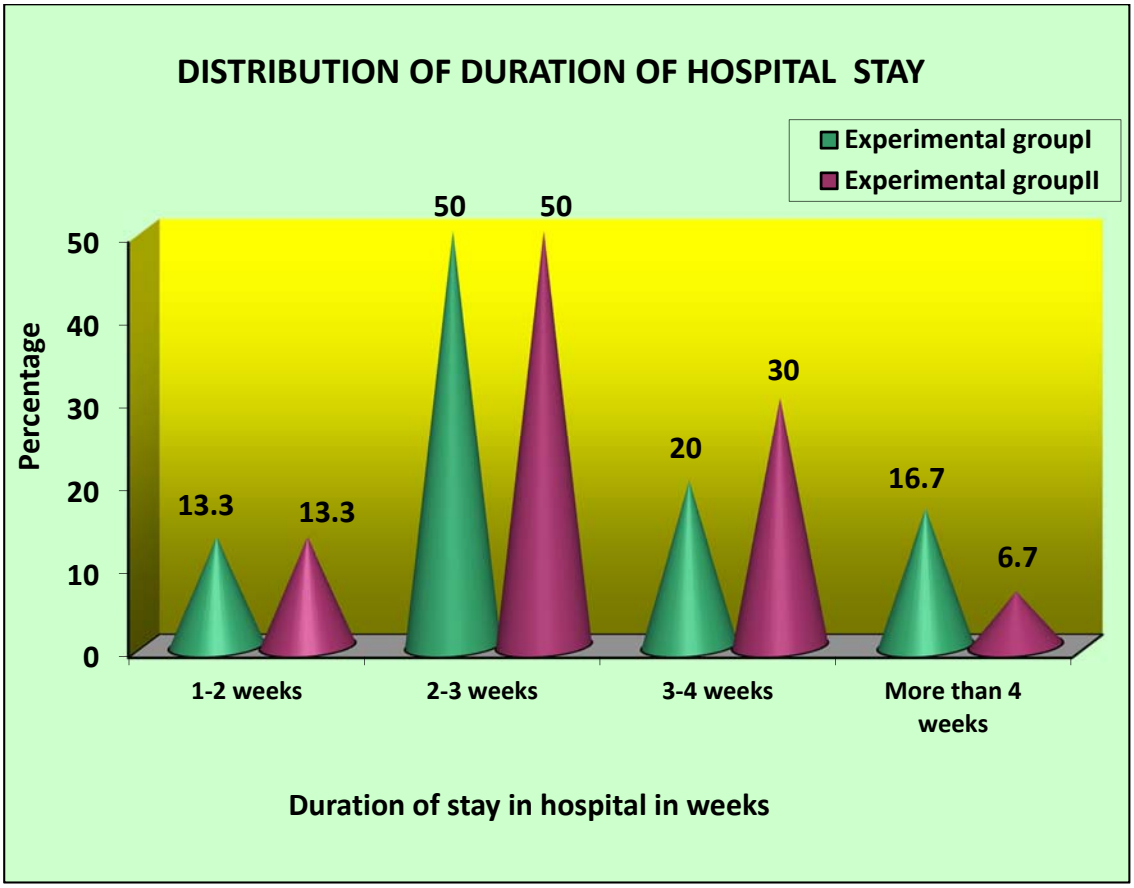

Figure.10 Percentage wise distribution of participants according to duration stay in of hospital

The above multiple cone diagram reveals that the most of the study participants according to their duration of stay in hospital (50%) and (50%) were between 2-3 weeks, least of the participants (13.3%) were between1-2 weeks and (6.7%) were more than 4 weeks for experimental group I and experimental group II respectively.

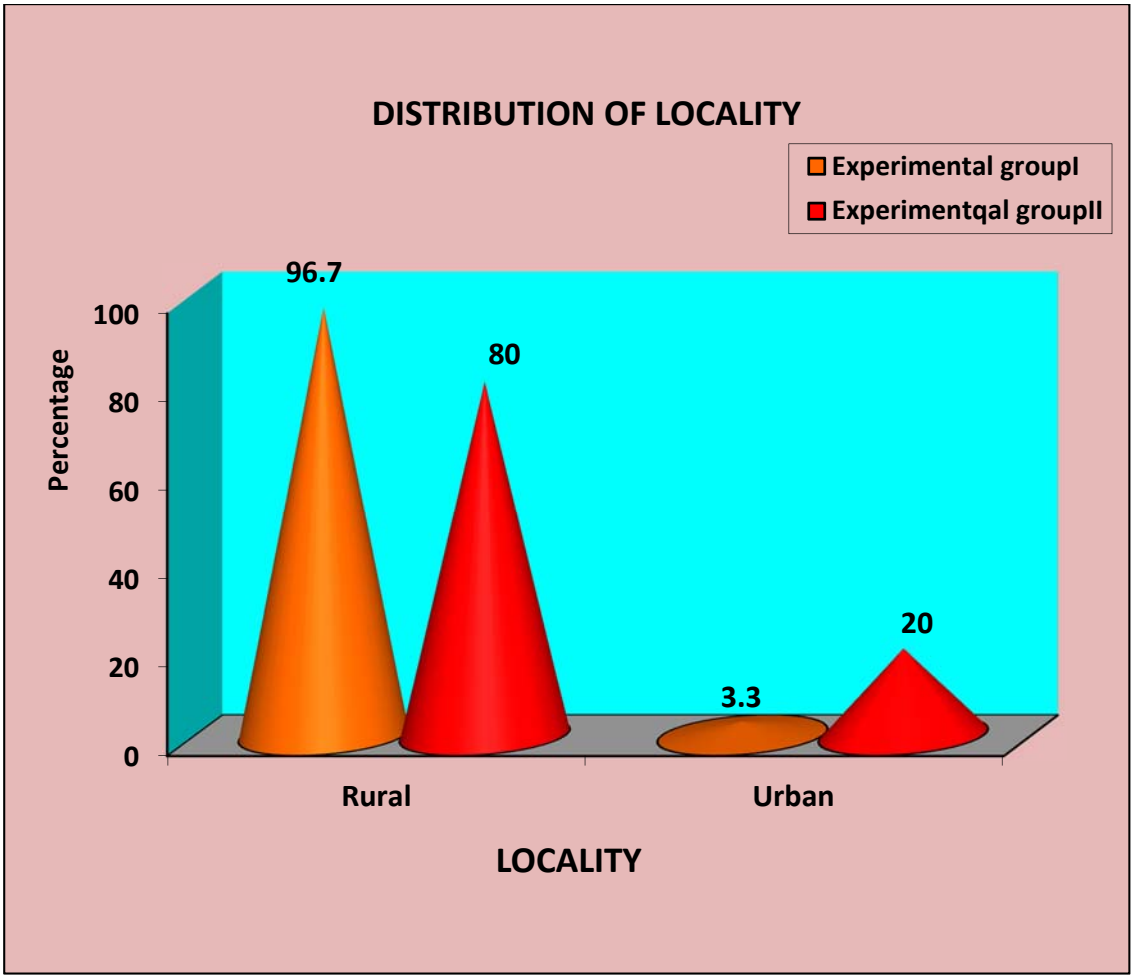

Figure.11 Percentage wise distribution of participants according to case residency

The above multiple cone diagram reveals that the most of the study participants according to their Locality (96.7%) and (80%) were rural area and the least of the study participants (3.3%) and (20%) were urban area for experimental group I and experimental group II respectively.

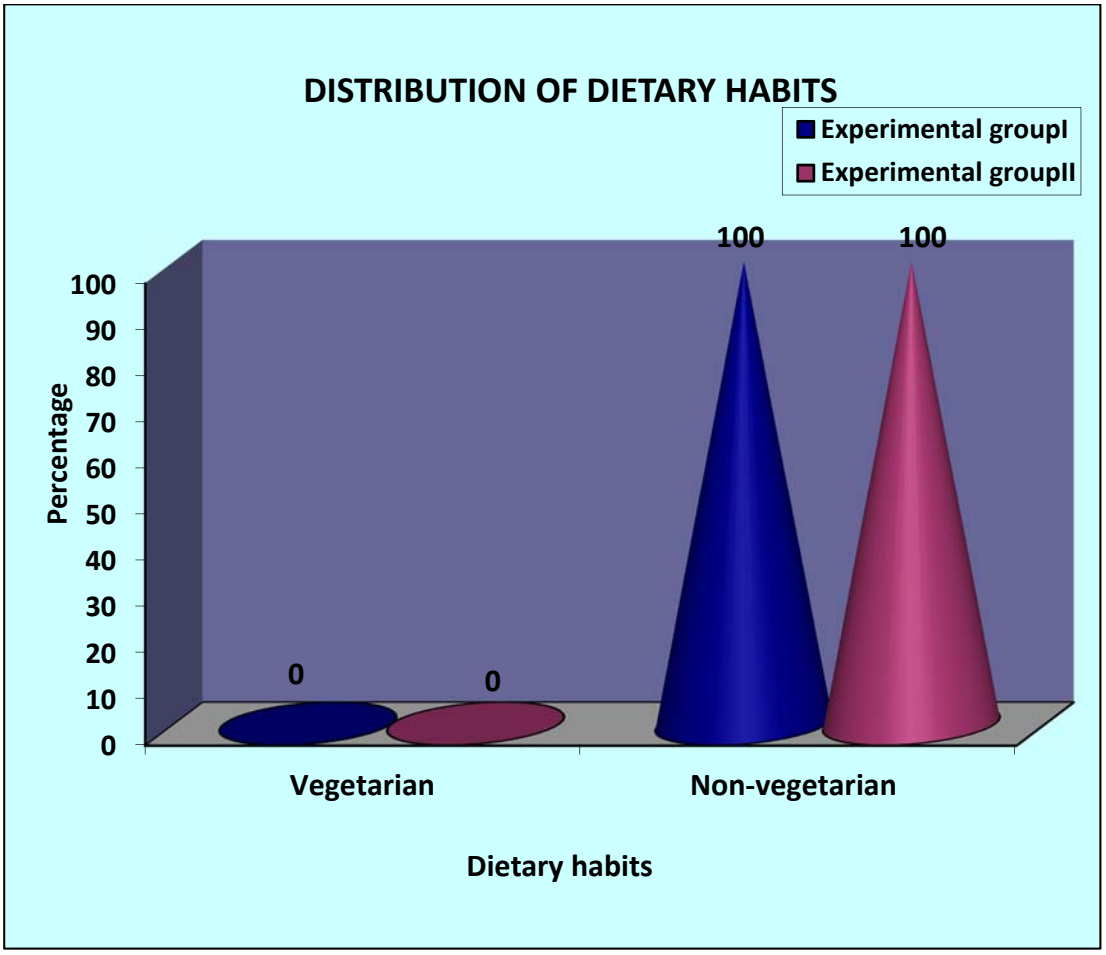

Figure.12 Percentage wise distribution of participants according to dietary habits.

The above multiple cone diagram reveals that the study participants according to their dietary habits (100%) were non vegetarian both experimental group I and experimental group II.

SECTION-II

Description of patients with external skeletal fixators according to the level of pin site infection for experimental group I and experimental group II.

TABLE -2
Frequency and percentage to assess level of pin site infection for experimental group I and experimental group II.

Level of infection	Experimental group I				Experimental group II			
	Pre		Post		Pre		Post	
	f	%	f	%	f	%	f	%
No infection	-	-	11	36.7	-	-	5	16.7
Minor infection	28	93.3	19	63.3	28	93.3	25	83.3
Major infection	2	6.7	-	-	2	6.7	-	-
Total	30	100	30	100	30	100	30	100

The above table shows that in both groups (93.3%) study participants had minor infection.(6.7%) had major infection,and none of them had with out infection.

In the post test (36.7%) and (16.7%) had no infection, (63.3%) and (83.3%) had minor infection, none of them had major infection in experimental group I and experimental group II respectively.

LEVEL OF PIN SITE INFECTION

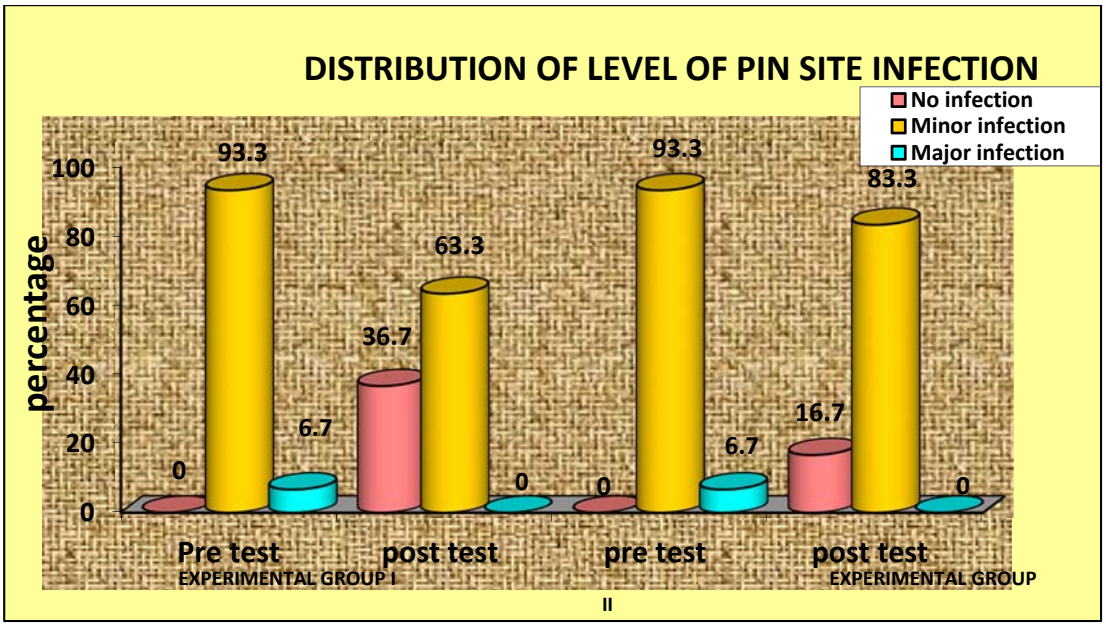

Figure 13. Distribution of level of pin site infection

The above figure shows that in experimental group I and experimental group II before intervention (93.3%) had minor infection (6.7%) had major infection,none of them had without infection.

In the post test (36.7%) and (16.7%) had no infection, (63.3%) and (83.3%) had minor infection, none of them had major infection in experimental group I and experimental group II respectively.

SECTION- III

Effectiveness of hydrogen peroxide dressing in experimental group I and betadine dressing in experimental group II.

TABLE-3
Effectiveness of pre test and post test level of pin site infection among patients with external skeletal fixators in experimental group I.

Test	Mean	Median	SD	Mean %	IQR-(3rd quartile-1st quartile	Mean difference	Z Value	P Value
Pre test	2.37	2	0.76	40	2-3	26	4.932	0.000***
Post test	0.83	1	0.79	14	0-1			

Table 3 depicts the comparison of pre test and post test level of pin site infection among patients with external skeletal fixators in experimental group I. The mean difference between pre test and post test was 26. The Z value was 4.932and p value was 0.000 which was significant at P< 0.001 level which showed hydrogen peroxide dressing was effective in treating pin site infection by using Wilcoxon signed rank test.

TABLE-4

Effectiveness of pre test and post test level of pin site infection among patients with external skeletal fixators in experimental group II.

Test	Mean	Median	SD	Mean %	IQR-(3rd quartile-1st quartile	Mean difference	Z Value	P Value
Pre test	2.3	2	0.84	38	2-3	15	5.196	0.000***
Post test	1.4	1.5	0.86	23	1-2			

Table 4 depicts the comparison of pre test and post test level of pin site infection among patients with external skeletal fixators in experimental group II. The mean difference between pre test and post test was 15. The Z value was 5.196 and p value was 0.000 which was significant at P< 0.001 level which showed betadine dressing was effective in treating pin site infection by using Wilcoxon signed rank test.

SECTION-IV

Comparison between the effectiveness of hydrogen peroxide dressing in experimental group I and betadine dressing in experimental group II.

TABLE-5

Comparison of pre test levels of pin site infection among patients with external skeletal fixators in experimental group I and experimental group II.

Test	Mean	Median	SD	Mean %	IQR-(3rd quartile-1st quartile	Mean difference	Z Value	P Value
Pretest - Group I	2.37	2	0.76	40	2-2	17	0	1
Pre test – Group II	2.3	2	0.84	23	2-2			

(P<0.001 highly significant)

Table 5 depicts the comparison of pre test levels of pin site infection among patients with external skeletal fixators in experimental group I and experimental group II. The Z value was 0 and p value was 1which was no significant at P< 0.001 level by using Mann-Whitney u test.

TABLE-6

Comparison of post test levels of pin site infection among patients with external skeletal fixators in experimental group I and experimental group II.

Test	Mean	Median	SD	Mean %	IQR-(3rd quartile-1st quartile	Mean difference	Z Value	P Value
Post test - Group I	0.83	1	0.79	14	0-1	9	2.618	0.000***
Post test – Group II	1.4	1.5	0.86	23	1-2			

(P<0.001 highly significant)

Table 6 depicts the comparison of post test levels of pin site infection among patients with external skeletal fixators in experimental group I and experimental group II. The Z value was 2.618 and p value is 0.000 which was significant at P< 0.001 level by using Mann-Whitney u test.

SECTION-V

Association of level of pin site infection for experimental group I and experimental Group II with their selected socio demographic variables.

TABLE- 7

Association of post test level of pin site infection for experimental group I with their selected socio demographic variables.

n=60

S. No	Demographic variables	No		Minor		Major		X^2-value	p-value
		f	%	f	%	f	%		
1.	**Age in years:**								
	a)18-25	5	16.7	5	16.7	-	-		
	b)26-30	1	3.3	2	6.7	-	-	4.62	0.202
	c)31-40	0	0	6	20	-	-	(df=3)	
	d)41-50	5	16.7	6	20	-	-		
2.	**Sex:**								
	a)Male	10	33.3	18	60	-	-	0.164	0.685
	b)Female	1	3.3	1	3.3	-	-	(df=1)	
3.	**Religion:**								
	a)Hindu	8	26.7	19	63.3	-	-		
	b)Christian	2	6.7	0	0	-	-	5.76	0.056
	c)Muslim	1	3.3	0	0	-	-	(df=2)	
	d)Others	0	0	0	0	-	-		
4.	**Educational status:**								
	a)Illiterate	3	10	3	10	-	-		
	b)School education	7	23.3	15	50	-	-	0.835	0.659
	c)Degree	1	3.3	1	3.3	-	-	(df=2)	
	d)Others	0	0	0	0	-	-		
5.	**Marital status:**								
	a)Unmarried	4	13.3	3	10	-	-		
	b)Married	7	23.3	16	53.3	-	-		
	c)Widow	0	0	0	0	-	-	1.65	0.199
	d)Divorced	0	0	0	0	-	-	(df=1)	
	e)Separated	0	0	0	0	-	-		
6.	**Occupation:**								
	a)Driver	1	3.3	1	3.3	-	-		
	b)Former	6	20	15	50	-	-	2.01	0.366
	c)Professionals	0	0	0	0	-	-	(df=2)	
	d)Others	4	13.3	3	10	-	-		

S. No	Demographic variables	No		Minor		Major		X^2-value	p-value
		f	%	f	%	f	%		
7.	**Income in Rs:**								
	a)1000-1500	0	0	4	13.3	-	-		
	b)1501-2000	3	10	5	16.7	-	-	3.26	0.352
	c)2001-2500	6	20	6	20	-	-	(df=3)	
	d)2501-3000	2	6.7	4	13.3	-	-		
8.	**Duration of stay in hospital:**	1	3.3	3	10	-	-		
	a)1-2 weeks	7	23.3	8	26.7	-	-	1.94	0.585
	b)2-3 weeks	1	3.3	5	16.7	-	-	(df=3)	
	c)3-4 weeks	2	6.7	3	10	-	-		
	d)More than 4 weeks								
9.	**Locality:**								
	a)Rural	10	33.3	19	63.3	-	-	1.78	0.181
	b)Urban	1	3.3	0	0	-	-	(df=1)	
10.	**Dietary habits:**								
	a)Vegetarian	0	0	0	0	-	-	0	1
	b)Non-vegetarian	11	36.7	19	63.3	-	-		

(*-P<0.05, significant and **-P<0.01 & ***-P<0.001 , Highly significant)

The above table shows there was no significant association in post test level of infection with selected socio demographic variable in experimental group I.

TABLE-8

Association of post test level of pin site infection for experimental group II with their selected socio demographic variables.

n=60

S. No.	Demographic variables	No		Minor		Major		X^2-value	p-value
		f	%	f	%	f	%		
1.	**Age in years:**								
	a)18-25	0	0	4	13.3	-	-		
	b)26-30	0	0	5	16.7	-	-	4.4	0.221
	c)31-40	4	13.3	8	26.7	-	-	(df=3)	
	d)41-50	1	3.3	8	26.7	-	-		
2.	**Sex:**								
	a)Male	5	16.7	19	63.3	-	-	1.5	0.221
	b)Female	0	0	6	20	-	-	(df=1)	
3.	**Religion:**								
	a)Hindu	5	16.7	24	80	-	-		
	b)Christian	0	0	1	3.3	-	-	0.206	0.649
	c)Muslim	0	0	0	0	-	-	(df=1)	
	d)Others	0	0	0	0	-	-		
4.	**Educational status:**								
	a)Illiterate	1	3.3	6	20	-	-		
	b)School education	4	13.3	15	50	-	-	1.09	0.579
	c)Degree	0	0	4	13.3	-	-	(df=2)	
	d)Others	0	0	0	0	-	-		
5.	**Marital status:**								
	a)Unmarried	0	0	2	6.7	-	-		
	b)Married	5	13.3	23	76.6	-	-	0.43	0.513
	c)Widow	0	0	0	0	-	-	(df=1)	
	d)Divorced	0	0	0	0	-	-		
	e)Separated	0	0	0	0	-	-		
6.	**Occupation:**								
	a)Driver	2	6.7	2	6.7	-	-		
	b)Former	3	10	17	56.7	-	-	4.44	0.109
	c)Professionals	0	0	0	0	-	-	(df=2)	
	d)Others	0	0	6	20	-	-		
7.	**Income in Rs:**								
	a)1000-1500	0	0	1	3.3	-	-		
	b)1501-2000	1	3.3	8	26.7	-	-		
	c)2001-2500	3	10	6	20	-	-	2.65	0.448
	d)2501-3000	0	0	10	33.3	-	-	(df=3)	

S. No.	Demographic variables	No		Minor		Major		X^2-value	p-value
		f	%	f	%	f	%		
8.	**Duration of stay in hospital:**								
	a)1-2 weeks	0	0	4	13.3	-	-		
	b)2-3 weeks	4	13.3	11	36.7	-	-	2.48	0.479
	c)3-4 weeks	1	3.3	8	26.7	-	-	(df=3)	
	d)More than 4 weeks	0	0	2	6.7	-	-		
9.	**Locality:**								
	a)Rural	4	13.3	20	66.7	-	-	0	1
	b)Urban	1	3.3	5	16.7	-	-	(df=1)	
10.	**Dietary habits:**								
	a)Vegetarian	0	0	0	0	-	-	0	1
	b)Non-vegetarian	5	16.7	25	83.3	-	-		

(*-P<0.05, significant and **-P<0.01 & ***-P<0.001, Highly significant)

The above table shows there was no significant association status in post test level of infection with selected demographic variable in experimental group II.

Discussion

CHAPTER V

DISCUSSION

The aim of the study was to compare the effectiveness of hydrogen peroxide dressing versus betadine dressing on pin site infection among patients with external skeletal fixators. The true experimental design was used for this study. Simple random sampling technique-lottery method was used to select the samples. A total number of 60 samples were selected, among 30 samples were treated with hydrogen peroxide dressing and remaining 30 samples are treated with betadine dressing. A checkett's and otter burn's grading system was used for data collection. After data collection, data was organized, tabulated, summarized and analyzed. The study findings were discussed in this chapter with reference to the objectives of the study.

DISCUSSION OF THE SOCIO DEMOGRAPHIC VARIABLE OF THE SAMPLE:

In the view of age, majority of study participants in experimental group I, 11 (36.7%) were between 41-50 years, 10 (33.3%) were between 18-25 years, 6 (20%) were between 31-40 years 3(10%) were between 26-30 years. Majority of study participants in experimental group II 12(40%) were between 31-40 years, 9(30%) were between 41-50 years, 5(16.7%) were between 26-30 years, remaining 4(13.3%) were between 18-25 years.

With regard to the sex majority of study participants in experimental group I, 28 (93.3%) were male and remaining 2 (6.7%) were female. Majority of study participants in experimental group II 24(80%) were male and remaining 6(20%) were female.

With regard to the religion, Majority of study participants in experimental group I27 (90%) were Hindu, 2(6.7%) were Christian, and remaining 1(3.3%)Muslim, (0%) were Others. Majority of study participants in experimental group II 29(96.7%) were Hindu, 1(3.3%) were Christian, (0%) were Muslim, (0%) Others.

As far as educational status was concern majority of study participants in experimental group I 22(73.3%) were School education, 6(20%) were Illiterate, 2(6.7%) were Degree, (0%) were others. Majority of study participants in experimental group II 19(63.3%) Were School education, 7(23.3%) Were Illiterate, 4(13.3%) were Degree, (0%) were others.

With regard to the Marital status, Majority of study participants in experimental group I 23(76.7%) were Married and remaining 7 (23.3%) were unmarried, (0%) were Widow, Divorced, and Others. Majority of study participants in experimental group II 28(93.3%) were Married, 2(6.7%) were unmarried, (0%) were Widow, Divorced, and Others.

In the view of occupation in experimental group I Majority of study participants 21(70%) were Former, 7(23.3%) were others, 2(6.7%) were Driver, (0%) were Professionals. Majority of study participants in Experimental group II 20(66.7%) were former, 6(20%) were others, 4(13.3%) were Driver, (0%) were Professionals.

With regard to the Income, Majority of study participants in experimental group I 12(40%) were Rs.2001-2500, 8(26.7%) were Rs.1501-2000, 6(20%) were Rs.2501-3000, 4(13.3%) were Rs.1000-1500. Majority of study participants in

experimental group II 11(36.7%) were Rs.2501-3000, 9(30%) were Rs.2001-2500, 9(30%) were Rs.1501-2000, and remaining 1(3.3%) were Rs.1000-1500.

With regard to the duration of stay in hospital, Majority of study participants in experimental group I 15(50%) were 2-3 weeks, 6(20%) were 3-4 weeks, 5(16.7%) were more than 4 weeks, 4(13.3%) were 1-2 weeks. Majority of study participants in experimental group II 15(50%) were 2-3 weeks, 9(30%) were 3-4 weeks, 4(13.3%) were 1-2 weeks, 2(6.7%) were more than 4 weeks.

With regard to the locality, Majority of study participants in experimental group I 29(96.7%) were rural remaining 1(3.3%) were Urban. Majority of study participants in experimental group II 24(80%) were rural and 6(20%) were Urban area.

In the view of Dietary habits, Majority of study participants in experimental group I 30(100%) were non vegetarian and (0%) were vegetarian, Majority of study participants in experimental group II 30(100%) were non vegetarian and (0%) were vegetarian.

FINDING BASED ON THE OBJECTIVES

- To assess the level of pin site infection among experimental patients with external skeletal fixators in orthopedic ward at Government Rajaji Hospital at Madurai-20.
- To evaluate the effectiveness of hydrogen peroxide dressing in experimental group I and betadine dressing in experimental group II.
- To compare the effectiveness between hydrogen peroxide dressing in experimental group I and betadine dressing in experimental group II.

- To associate the level of pin site infection among experimental group I and group IIpatients with external skeletal fixator and their selected socio demographic variables experimental group I and group II.

The first objective of the study "To assess the level of pin site infection among patients with external skeletal fixators in orthopedic ward at Government Rajaji Hospital at Madurai-20".

In experimental group I and experimental group II in pretest (93.3%) had minor infection. (6.7%) had major infection,none of them hadwithout infection.

In the post test (36.7%) and (16.7%) had no infection, (63.3%) and (83.3%) had minor infection, none of them had major infection in experimental group I and experimental group II respectively.

This study supported by Sonali Banerjee, et al (2006) as a quasi experimental had undertaken in the selected wards of Nehru Hospital, PGIMER, Chandigarh. Twenty seven patients with 184 pin sites were studied during January-February 2006and randomized into two experimental groups namely, experimental group I and experimental group II. Patients in experimental group I, comprised of 14 patients cleaning pin site with 3% hydrogen peroxide and 13 patients in experimental type II with betadine dressing. Checketts and Otterburn's1 definition was adopted to define pin site infection. On 7th day of intervention, 2(2.1%) pin sites had grade-II infection when treated with type I protocol .Results with type II protocol revealed 38.4% pin sites had grade-I infection , 7% had grade-II and 4.6% had grade -III infection.

The second objective of the study "To evaluate the effectiveness of hydrogen peroxide dressing in experimental group I and betadine dressing in experimental group II".

Comparison of pre test and post test level of pin site infection among patients with external skeletal fixators in experimental group I. The mean difference between

pre test and post test was 26. The Z value was 4.932 and p value was 0.000 which was significant at P< 0.001 level which showed hydrogen peroxide dressing was effective in treating pin site infection.

Comparison of pre test and post test level of pin site infection among patients with external skeletal fixators in experimental group II. The mean difference between pre test and post test was 15. The Z value was 5.196and p value was0.000 which was significant at P< 0.001 level which showed betadine dressing was effective in treating pin site infection.

Thus , HI; The mean post assessment scores of pin site infection among experimental group I and group II will be significantly lower than the mean pre assessment scores of the experimental group I and group II was accepted.

The third objective of the study "to compare the effectiveness between hydrogen peroxide dressing in experimental group I and betadine dressing in experimental group II.

Comparison of pre test levels of pin site infection among patients with external skeletal fixators in experimental group I and experimental group II. The mean difference between the post test levels was 17. The Z value was 0and p value was 1 which was no significant at P< 0.001 level.

Comparison of post test levels of pin site infection among patients with external skeletal fixators in experimental group I and experimental group II. The mean difference between the post test levels was 9. The Z value was 2.618 and p value was 0.000 which was significant at P< 0.001 level which showed hydrogen peroxide dressing was effective in treating pin site infection.

This study supported by Sonali Banerjee, et al (2006) as a quasi experimental had undertaken in the selected wards of Nehru Hospital, PGIMER, Chandigarh. Twenty seven patients with 184 pin sites were studied during January-February 2006and randomized into two experimental groups namely, experimental group I and experimental group II. Patients in experimental group I, comprised of 14 patients cleaning pin site with 3% hydrogen peroxide and 14 patients in experimental type II with betadine dressing. Checketts and Otterburn's1 definition was adopted to define pin site infection. On 7th day of intervention, , 2(2.1%) pin sites had grade-II infection when treated with type I protocol. Results with type II protocol revealed 38.4% pin sites had grade-I infection, 7% had grade-II and 4.6% had grade -III infection. Cleaning pin site with 3% hydrogen peroxide dressing is highly effective than betadine dressing.

Thus, H2; There is a significant difference between the level of pine site infection for experimental group I and group IIwas accepted.

The fourth objective of the study "to associate the level of pine site infection among experimental group I and experimental group II patients with external skeletal fixator and their selected demographic variables."

There was no significant association in post test level of infection with selected demographic variable in experimental group I and group II.

Thus, H_3 ; There is a significant association between the level of pin site infection among patients with their selected demographic variables for experimental group I and group II**.** was rejected.

Summary, Conclusion & Recommendations

CHAPTER VI
SUMMARY, CONCLUSION, IMPLICATION AND RECOMMENTATIONS

This chapter includes the summary, conclusion and implications, recommendations and limitations of the study in the field of nursing.

6.1 SUMMARY OF THE STUDY

The purpose of the study was to compare the effectiveness of hydrogen peroxide dressing versus Betadine dressing on pin site infection among patients with external skeletal fixators in orthopaedic ward at Government Rajaji Hospital, Madurai-20.

The study was carried out with the following objectives

- To assess the level of pin site infection among patients with external skeletal fixators in orthopaedic ward at Government Rajaji Hospital, Madurai-20.
- To evaluate the effectiveness of hydrogen peroxide dressing in experimental group I and betadine dressing in experimental group II.
- To compare the effectiveness between hydrogen peroxide dressing in experimental group I and Betadine dressing in experimental group II.
- To associate the level of pin site infection among experimental group I and group II patients with external skeletal fixators with their selected socio demographic variables.

The following research hypothesis were formulated for the study

H_1: The mean post assessment scores of pin site infection among experimental group I and group II will be significantly lower than the mean pre assessment scores of the experimental group I and group II.

H2:. There is a significant difference between the level of pin site infection for experimental group I and group II.

H_3: There is a significant association between the level of pin site infection among experimental group I and group II patients and their selected socio demographic variables.

The conceptual frame work based on Modified Imogene King's Goal Attainment Theory (1981) based on the personal & interpersonal systems including interaction, perception, judgment, action and transaction.

The tool consists of patients demographic variables-Age, sex, religion, education, Marital status, occupation and family income, duration of stay in hospital, locality, dietary habits and Checkett's and Otter burn's grading system to evaluate the pin site infection. It has six grading system with two to three characteristics in each.

Descriptive statistics:

- The descriptive statistical analysis includes frequency, mean, standard deviation, percentage, was planned for demographic variable.

Inferential statistics:

- Wilcoxon signed rank test was planned to find out the effectiveness of hydrogen peroxide dressing in experimental group I and betadine dressing in experimental Group II.

- Mann-Whitney u test was plan for compare the effectiveness between hydrogen peroxide in experimental group I and betadine dressing in experimental Group II.
- Chi square test was planned to find out the association between the level of pin site infection among experimental group I and experimental group II patients with external skeletal fixators with their selected socio demographic variables.

6.2 MAJOR FINDINGS OF THE STUDY

- In experimental group I and experimental group II in pretest (93.3%) had minor infection.(6.7%) had major infection, none of them had with out infection.
- In the post test (36.7%) and (16.7%) had no infection, (63.3%) and (83.3%) had minor infection, none of them had major infection in experimental group I and experimental group II respectively.
- Comparison of pre test and post test level of pin site infection among patients with external skeletal fixators in experimental group I. The mean difference between pre test and post test was 26. The Z value was 4.932 and p value was 0.000 which was significant at P< 0.001 level which showed hydrogen peroxide dressing was effective on pin site infection.
- Comparison of pre test and post test level of pin site infection among patients with external skeletal fixators in experimental group II. The mean difference between pre test and post test was 15. The Z value was 5.196and p value was 0.000 which was significant at P< 0.001 level which showed betadine dressing was effective on pin site infection. Hence the first hypothesis was accepted.

- ❖ Comparison of pre test levels of pin site infection among patients with external skeletal fixators in experimental group I and experimental group II. The mean difference between the post test levels was 17. The Z value was 0and p value was 1 which was no significant at P< 0.001 level.
- ❖ Comparison of post test levels of pin site infection among patients with external skeletal fixators in experimental group I and experimental group II. The mean difference between the post test levels was 9. The Z value was 2.618and p value was 0 which was significant at P< 0.001 level which showed hydrogen peroxide dressing was effective in treating pin site infection. Hence the second hypothesis was accepted.
- ❖ There was no significant association in post test level of pin site infection with selected demographic variable in experimental group I and group II. Hence the third hypothesis was rejected.

6.3 CONCLUSION

This study satistically proved that the intervention of hydrogen peroxide dressing was effective on pin site infection compared to betadine dressing.

6.4 IMPLICATIONS

The findings of the study have practical application in the field of nursing. The implications of the study could be discussed in four areas namely nursing practice, nursing administration, nursing education and nursing research.

Implications for nursing practice

The finding of study will help the nurses in the following ways.

1. Early identification and prevention of the complication of external skeletal fixator.

2. Hydrogen peroxide is an inexpensive, and has no adverse side effects, nurses can use for pin site care, without doctors orders.

Implications for Nursing Education

1. This study enhance the nursing students to acquire knowledge, assessment of pin site infection and care of patient on pin site infection.
2. This study enhances the student to think comprehensively in planning her/ his intervention on pin site infection.
3. This study provokes critical thinking to the student.
4. This study arouses motivation to the student to intelligibility care for client with external fixator.

Implications for Nursing Administration

1. The study to provide critical thinking regarding external fixator and its management.
2. A separate pin site care team can be incorporated for the care of all external fixators, which will prevent complications and improve the standard of nursing care as well as the hospital.
3. Standard protocol can be formulated on pin site infection by selecting appropriate dressing.
4. Formulation of standard policy regarding pin site care on pin site infection.
5. The nurse administrator can arrange seminars, conference, and workshop to educate for nurses regarding the importance of pin site care.

Implication for nursing research

1. This study motivates for further studies related to this field.
2. This study calls for further studies on cost effective management on pin site infection of patient with external fixators.
3. This study will help the researcher to formulate new methods of care pin site infection.
4. This study can be base line for further studies.

6.5 RECOMMENDATIONS

1. A similar study can be replicated with large sample.
2. A comparative study can be conducted to find out the effectiveness of betadine dressing versus normal saline dressing on pin site infection among patients with external fixators.
3. A similar study can be conducted to find out the effectiveness of hydrogen peroxide dressing, betadine dressing and normal saline dressing on pin site infection among patients with external fixators.
4. A study can be conducted to evaluate the knowledge and the attitude of nurses regarding pin site care.
5. A comparative study can be done to find the incidence of pin site infection among different types of external skeletal fixators.
6. An explorative study can be done at various settings to identify factors influencing the pin site care.

References

REFERENCE

BOOKS

1. Adrianne, D. L. (2007*). Introduction to Medical Surgical Nursing* (4th Eds.,). Philadelphia: Elsevier Science Limited.
2. Alligard, M R. (2002).*Nursing Theorists and theirWork*. (5th Eds.,). Philadelphia:Mosby company limited.
3. Basavanthappa, B.T. (2009). *Medical Surgical Nursing.* (2nd Eds.,). New Delhi: Jaypee brothers medical publishers.
4. Barbara, K. (2007). *Introduction to Medical Surgical Nursing*. London: Lippincott Williams & Wilkins publisher.
5. Gupta, S.P., (2000). *Statistical Methods* (5*th*ed.). New Delhi: Sultan Chand Publications.
6. John Ebenezer. (2005).*Orthopedics for nurses.(1st Eds.).*New Delhi: Jaypee brothers medical publishers.
7. Joyce,M.Black. (2005). *Medical – Surgical Nursing*. (7th Eds.,). India: Elsevier publication.
8. Kothari,C. R (2004). *Research Methodology- Methods & Techniques.* New Delhi: New Age International Publishers.
9. Kumar and Clark. (2002).*Clinical Medicine*. (5th Eds,.).W.B. U.K :Saunders Pvt Ltd.
10. Kalava,.S.(2004). *Text book of orthopedics.*(1st Eds.).Hyderabad: Paras medical publisher.
11. Lewis. (2011). *Textbook of Medical Surgical Nursing*. (9th Eds,.). St. Louin Missouri:Mosby publishers.

12. Linton. (2007). *Introduction to Medial Surgical Nursing*.(14th Eds,.). Missouri:Saunders Company
13. Lippincott Williams Wilkins. (2010). *Manual of Nursing Practice.(* 9th Eds,.). New Delhi: Wolters Kluwer (India) Pvt Ltd.
14. Long Phipps. (1993). *Medical Surgical Nursing.*(3rd Eds,.). London: Mosby publishers.
15. Matthew Cahill. (2002). *Mastering medical and surgical nursing*.. Edinburgh: Churchil living stone. .
16. Nichola, A. Boon. (2006). *Davidson's Principles and Practice of Medicine*. New York: Churchill Livingstone.
17. Mahajan, B. K. (1991). *Methods in Biostatistics.* New Delhi: Jaypee Brothers.
18. Matthew Cahill. (2002). *Mastering medical and surgical nursing.* Edinburgh: Churchill living stone.
19. Pareek Bharat & Sharma Shivani. (2009). *A Text Book of Nursing Research and Statistics.* Jaladhar S. Vikas & Co. Publishers.
20. Polit & Hungler. (1999). *Nursing Research: Principles and Methods*. Philadelphia: J.B. Lippincott Company.
21. Peter S.Davis(1994).*Nursing the orthopedic patient.*(1st Eds.),U.K: Churchill livingstone publication
22. Ross and Wilson. (2010). *Anatomy and Physiology in health medicines*. (9th Eds.,). Evolve, Churchill Livingstone:
23. Sandra M.Neetina. (2009). *Manual of Nursing Practice*. (7th Eds,.). Philadelphia:Lippincott company
24. Susan C. Dewit, (1998*). Essentials of Medical Surgical Nursing* (4th Eds.,). Philadelphia: W.B. Saunders Company.

25. Suzanne. C Smeltzer Brenda G Bare. (2010). *Text Book of Medical Surgical Nursing*. (11th Eds,.). Philadelphia:Lippincott publications.
26. Rao. (2004). *Methods of Biostatistics.* (2Eds). Hyderabad: Para Medical Publications.
27. Suresh K Sharma. (2010). *Nursing Research and Statistics.* New Delhi: Elseiver Publications.
28. Talbot, Laura. (1994). *Principles and Practice of Nursing Research*. Chicago: C.V.Meshy Company.
29. Treece EW and Treece JW. (1998). *Elements of Research in Nursing*. St.Louis: Mosby Publishers.
30. Veer Bala Rastogi. (2010). *Fundamentals of Biostatistics.* (2 Eds). New Delhi: Ane Books Pvt. Ltd.

JOURNALS

1. Antoci V, Ono CM, Antoci V Jr, Raney EM. Pin tract infection during limb lengthening using external fixation. *American Journal of Orthopaedics* (Belle Mead NJ) 2008 Sep: 37(9):E150-4.
2. Althoff D. External fixation of the lower extremity. Care considerations. National Association of American Orthopaedic Nurses1984: 60-62.
3. Ahlborg HG, Josefsson PO (1999) Pin-tract complications in external fixation of fractures of the distal radius. *Acta Orthopaedics Scand* **70(2):**116–18
4. Anthony J Janetti. An introduction to orthopaedic nursing. 2nd edition. New Jersey: *National Association of Orthopaedic Nurses*;1999.
5. Behrens F. General theory and principles of external fixation. Clinical *Orthopaedics and Related Research* 1989; 24: 15-23.

6. Bernardo LM. Evidence-based practice for pin site care in injured children. *Journal of Orthopaedic Nursing* 2001; 20(5): 29-34.

7. Blaiser RD, Aronson J, Tursky EA. External fixation of pediatric femur fractures. *Journal of Pediatric Orthopaedics* 1997;**17**(3):342-6.

8. Checketts RG (2000) Pin track infection and the principles of pin site care. In: DeBastianiA, Graham Apley A, Goldberg DE, eds.*Orthofix External Fixation in Trauma and Orthopedics.* Springer, Berlin: 97–103

9. Celeste SM, Folcik MA, Dumas KM.Identifying a standard for pin site care using thequality assurance approach. *Orthopaedic Nursing* 1984;3 (4): 17-24.

10. Camilo AM, Bongiovanni JC. Evaluation of effectiveness of 10% polyvinylpyrrolidone-iodine solution against infections in wire and pin holes for Ilizarov external fixators.*Sao Paolo Medical Journal* 2005;**123**(2):58–61.

11. Coppola JA, Anzel HS. Use of hoffmannexternal fixator in the treatment of femoralfractures. *Clinical Orthopaedics and Related Research* 1983; 180: 78-95.

12. Davis, P. et al (2001) Pin sitemanagement. Towards aconsensus: part 2. *Journal of Orthopaedic Nursing*;5: 3, 125–130.

13. Edward Scott. Effectiveness of External Fixation; Medical Perspectives. *International Journal of Orthopedic.* 2006 Mar 2; 29(4):33-38

14. Egol KA, Nader Pakisma DO, Puopolo S, Klugman J,Heibert R, Koval K. Treatment of external fixation pinsabout the wrist: a prospective randomized trial. *Journal ofBone and Joint Surgery* 2006;**88-A**(2):349–54.

15. George CB, Dimitrios S, EvangeloP,Panagiotis K, Nikolopoulos.High energy Tibial Plateau Fractures Treated With Hybrid external Fixation. *Journal Of Orthopaedic Surgery And Research* 2011 6(3) : 35.

16. Green SA. Complications of externalfixation. *Clinical Or thopaedics and RelatedResearch* 1983;180: 109-116.
17. Gordon JE, Kelly-Hahn J, Carpenter C, Schoenecker P. Pin site care during external fixation in children: results of a holistic approach. *Journal of Pediatric Orthopaedics* 2000;**20**(2):163-5.
18. Grant A, Atar D, Lehman W. Pin care using the Ilizarov apparatus: recommended treatment plan in Kurgan, Russia. *Bulletin of the Hospital for Joint Diseases* 1992;**52**(1):18-20.
19. Gill K, Laflamme O. External fixation. The erector sets of orthopaedic nursing. Canadian Nurse 1984;80(5): 29-31.
20. Handoll HHG, Huntley JS, Madhok R. External Fixation Versus Conservative Treatment for Disatl Radial Fractures in Adults. *The Cochrane Library* 2007 18(3) : 10-22.
21. Haines, D. (2000) My Ilizarov experience. *Journal of OrthopaedicNursing*;4: 4, 191–193.
22. Holmes SB, Brown SJ, Pin Site Care Expert Panel (2005) Skeletal pin site care: *National Association of Orthopaedic Nurses guidelines for orthopaedic nursing.* **24(2):**99–107
23. John T Anderson, George L Lucas, Bruce R Buhr. Complications of Treating External Fixation- A Community Experience. *IOWA Orthopaedic Journal* 2004 2(24) : 53-59.
24. Jones Walton P. Clinical standards in skeletal traction pin site care. *Orthopaedic Nursing* 2010: 10(2): 12-16.

25. Kenneth AE, Nader Paksima, Sleven Puopolo, Jeffrey klugman, Rudi H, Koval et al.Treatment of External Fixation Pins About the Wrist- A Prospective Randomized Trial. *The Journal of Bone and Joint Surgery* 2006 Feb; 2(88): 349-354.

26. Kraemer P, Lee M B, Englehardt H, Chapman J R, Bransford R J.Infectious Pin Complication Rates in Halovest Fixators using Ceramic versus Metallic Pins. Journal of Spinal Disorders Technology 2010 Dec; 8(23) : 59-62.

27. Lee-Smith J et al (2001).Pin site management. Towards a consensus: *Part 1 Journal of Orthopedic Nursing*;5 ,37-42.

28. McKenzie LL. In search of a standard for pin site care. *Journal of Orthopaedic Nursing* 1999; 18(2): 73-8.

29. Mandruk LL. External pin site care. *Canadian nurses association* 1991;13:(1)10-15.

30. Mahan J, Saligson D, Henry SL, Hynes P,Dobbins J. Factors in pin tract infections.*Journal of Orthopaedic nursing.* 1991;14:(3)305-8.

31. Morris L, Kraft S, Tessem S, Reinisch S.Special care for skeletal traction. Registered Nurse 1988;51(2): 24-29.

32. Moroni A, Vannini F, Mosca M, Giannini S(2002) State of the art review: technique to avoid pin loosening and infection in external fixation. *Journal Orthopaedics Trauma 16(3):* 189–95

33. Naseem Ulgani, Kursheed Ahmed Kangoo, Arshad Bashir et al. External Fixation Of Intertrochanteric Fractures. *Orthopaedic Reviews (Pavia)* 2009 Oct; 1(2) : 18.

34. Nichol D. Preventing infection: orthopaedics, skeletal pins. *Nursing Times 1*993;4(1): 78-80.24.

35. Olson RS. Halo skeletal traction pin sitecare: towards developing a standard of care. *Journal of Orthopaedic Nursing* 1996; 21(5): 243-

36. Parameshwaran AD, Roberts CS, Seligson D, Voor M. Pin Tract Infection With Contemporary External Fixation – How Much A Problem. *Journal of Orthopaedic Trauma* 2003 Aug; 7 (17) : 503-507.

37. Paul G (2003), the history of external fixation. *Clinics in Pediatric Medicine and surgery*.20 (1), 1-8.

38. Patterson MM (2005) Multicenter pin carestudy. *Orthop Nurs* **24(5):** 349–60

39. Raju Puttakemba & KiniSunil Gurpur. Loss of Correction In Unstable Comminuted Distal Radius Fractures with External Fixation And Bone Grafting-Along Term Followup Study. *Journal Of Orthopaedic Surgery & Research* 2010 Jul; 23(6) :749-799.

40. Sisk TD. External fixation: Historic review, advantages, disadvantages, complications and indications. *Clinical Orthopaedics and Related Research* 1983;180: 15-22.

41. Sims M, Whiting J. Pin site care. *Nursing Times* 2000; 96(48): 44

42. Sproles KJ. Nursing of skeletal pins. Acloser look. *Orthopaedic Nursing* 1985;4(1): 11-19.

43. Sims M, Saleh M (2000) External fixation— the incidence of pin site infection: a prospective audit. *J ournal of Orthopedic Nursing* **4(2):**59–63

44. Sue Baird Holmes, Sarah Jo Brown. Skeletal pinsite care. Orthopaedic Nursing 2005: 24(2): 99-106.

45. Sonali Banerjee, Jogindra Vati. Pin site infections and care modalities. *Nightingale nursing times* 2008;4:(1)36-42.

46. Sheila Grant, David Kerr, Marianne Wallis, Don Pitchford. Comparison of povidone-iodine solution and soft white paraffin ointment in the management of skeletal pin-sites. *Journal of orthopaedic nursing* 2005;24:(5)349-360.
47. Sharma SK, Gupta JV, Walia I, Sen RK.Prevalence of pin site infection among patients with external skeletal fixation. *Nursing &Midwifery Research Journal* 2005; 1(2): 124-30.6.
48. Temple J, Santy J (2004) Pin site care forpreventing infections associated with external bone fixators and pins. *Cochrane Database Syst Rev* **(1):** CD004551
49. Trigueiro M. Pin site care protocol.*Canadian Nurse* 1983; 79(8): 24-6.
50. Vossinakis IC, Badras LS. The external fixator compared with the sliding hip screw for pertrochanteric fractures of the femur. *Journal of Bone and Joint Surgery. British Volume* 2002;**84-B**(1):23-9.
51. Wallis S. An agenda to promote self care. Nursing care of skeletal pin sites. *ProfessionalNurse* 1991;6, (12): 715-720.
52. Ward P (1998) Care of skeletal pins: a literature review. *Nursing Standard* **12(39):** 34–8
53. W-Dahl A, Toksvig-Larsen S, LindstrandA (2003) No difference between daily andweekly pin site care: a randomised study of 50patients with external fixation. ***Acta Orthop Scand*** **74(6):** 704–8
54. Wissing J, van der Werken C. Experiences with external fixation with emphasis on the complications. *Netherlands Journal of Surgery* 1988;**40**(2):46–8.
55. Wood M (2001) A protocol for care of skeletal pin sites. *Nursing Times*.97, 24, 66-68.

NET REFERANCES

1. http://www.ccn.aacnourals.org
2. http://www.clincaltrials.gov
3. http://www.currentnursing.com
4. http://health.allrefer.com/health/nursing assessment-info.html
5. http://www.medscape.com
6. http://www.ncbi.nlm.nih.gov
7. http://www.nursingtimesnet
8. http://www.pubmed.com
9. http://www.sciencedirect.com
10. http://www.thecochranelibrary.com
11. http://www.tnhealth.org
12. http://www.wikipedia.com
13. http://www.ncbi.nlm.nih.gov/pubmed

Appendices

APPENDIX – I

Letter seeking and granting permission to conduct the study in Orthopaedic Ward at Government Rajaji Hospital, Madurai

From

J.Manimozhi
M.Sc (N) I year student,
College of Nursing,
Madurai Medical College,
Madurai - 20.

To

The Professor and Head of the Department,
Department of Orthopedics,
Government Rajaji Hospital,
Madurai - 20.

Through: The proper Channel

Respected Sir,

Sub : College of Nursing, Madurai Medical College, Madurai — M.Sc., (N) I year Medical & Surgical Nursing Student — Permission letter for conducting study in Orthopedic ward at Government Rajaji Hospital — requested — regarding.

As per the curriculum recommended by the Tamilnadu Dr.MGR Medical University I year M.Sc (N) students are required to conduct a dissertation study. I have selected the study topic "A Study to Compare the Effectiveness of Hydrogen peroxide dressing versus Betadine dressing on Pin site infection among patients with External Skeletal Fixators, in Orthopaedic ward at Government Rajaji Hospital, Madurai-20" for the partial fulfillment of the course. I assure that I will not interfere with the routine activity of the department.

Kindly consider my request and permit me to conduct the study.

Thanking you,

Place: MADURAI

Date: 24.12.13.

Yours faithfully,

J.M

(J.MANIMOZHI)

Permitted

Prof. Dr.P.V. PUGALENTHI
M.S. Ortho., D.Ortho.,
PROFESSOR & H.O.D.
Dept. of Orthopaedic Surgery,
Traumatology, & Rehabilitation
GOVT. RAJAJI HOSPITAL.

PERMISSION LETTER

From

J.Manimozhi,
II year M.Sc Nursing Student,
College of Nursing,
Madurai Medical College,
Madurai — 20.

To

The Professor and Head of the Department,
Department of Orthopaedic,
Government Rajaji Hospital,
Madurai—20.

Through - The Proper Channel

Respected Madam,

Sub: II year M.Sc Nursing Student — College of Nursing, Madurai Medical College, Madurai — conducting Dissertation study — Orthopaedic Department, Government Rajaji Hospital, Madurai — permission — requested regarding;

As per the curriculum recommended by the Tamil Nadu Dr. M.G.R. Medical University, I have selected the topic "A Study to Compare the Effectiveness of Hydrogen peroxide dressing versus Betadine dressing on Pin site infection among patients with External Skeletal Fixators, in Orthopaedic ward at Government Rajaji Hospital, Madurai-20." for the partial fulfillment of the PG course.

I kindly request you to consider my letter and allow me to conduct the Pilot Study.

From 1.8.2014 to 7.8.2014.

Thanking you,

Date: 31.07.2014
Place: Madurai

Yours faithfully,

J.M.

(J.MANIMOZHI)

Forwarded
S.P
31/7/14

Permitted

Prof.Dr.P.V.PUGALENTHI
M.S. Ortho., D. Ortho.,
Chief Civil Surgeon In Orthopaedic Surgery

APPENDIX - II

ETHICAL COMMITTEE APPROVAL LETTER

Ref. No. 68/E4/2/2014 **Govt. Rajaji Hospital, Madurai.20. Dated: 02.2014**

Institutional Review Board / Independent Ethics Committee.
Captian. Dr. B. Santhakumar, M.D., (F.M.,)
Dean, Madurai Medical College &
Govt Rajaji Hospital, Madurai 625020. **Convenor**

Sub: Establishment-Govt. Rajaji Hospital, Madurai-20-
Ethics committee-Meeting Minutes- for January 2014
Approved list -regarding.

The Ethics Committee meeting of the Govt. Rajaji Hospital, Madurai was held on 20.1.2014, Monday at 10.00 am to 12.00.noon at the Anaesthesia Seminar Hall, Govt. Rajaji Hospital, Madurai. The following members of the committee have attended the meeting.

1.Dr. V. Nagarajan, M.D., D.M (Neuro) Ph: 0452-2629629 Cell.No 9843052029	Professor of Neurology (Retired) D.No.72, Vakkil New Street, Simmakkal, Madurai -1	Chairman
2. Dr.Mohan Prasad , M.S M.Ch Cell.No.9843050822 (Oncology)	Professor & H.O.D of Surgical Oncology(Retired) D.No.72, West Avani Moola Street, Madurai -1	Member Secretary
3. Dr. Parameswari M.D (Pharmacology) Cell.No.9994026056	Director of Pharmacology Madurai Medical College	Member
4. Dr.S. Vadivel Murugan, MD., (Gen.Medicine) Cell.No 9566543048	Professor of Medicine Madurai Medical College	Member
5. Dr.S. Meenakshi Sundaram, MS (Gen.Surgery) Cell.No 9842138031	Professor & H.O.D of Surgery Madurai Medical College	Member
6. Mrs. Mercy Immaculate Rubalatha, M.A., Med., Cell. No. 9367792650	50/5, Corporation Officer's quarters, Gandhi Museum Road, Thamukam, Madurai-20	Member
7. Thiru.Pala. Ramasamy , BA.,B.L., Cell.No 9842165127	Advocate, D.No.72.Palam Station Road, Sellur, Madurai -2	Member
8. Thiru. P.K.M. Chelliah ,B.A Cell.No 9894349599	Businessman, 21 Jawahar Street, Gandhi Nagar, Madurai-20	Member

The following Project was approved by the committee

..2..

Name of P.G.	Course	Name of the Project	Remarks
J. Manimozhi	M.Sc., Nursing, College of Nursing, Madurai Medical College, Madurai	A study to Compare the Effectiveness of Hydrogen Peroxide Dressing Versus Betadine Dressing on pin site infection among patients with external skeletal fixators, in Orthopaedic Ward at Government Rajaji Hospital, Madurai-20.	Approved

Please note that the investigator should adhere the following: She/He should get a detailed informed consent from the patients/participants and maintain it Confidentially.

1. She/He should carry out the work without detrimental to regular activities as well as without extra expenditure to the institution or to Government.
2. She/He should inform the institution Ethical Committee, in case of any change of study procedure, site and investigation or guide.
3. She/He should not deviate the area of the work for which applied for Ethical clearance. She/He should inform the IEC immediately, in case of any adverse events or Serious adverse reactions.
4. She/He should abide to the rules and regulations of the institution.
5. She/He should complete the work within the specific period and if any Extension of time is required He/She should apply for permission again and do the work.
6. She/He should submit the summary of the work to the Ethical Committee on Completion of the work.
7. She/He should not claim any funds from the institution while doing the work or on completion.
8. She/He should understand that the members of IEC have the right to monitor the work with prior intimation.

Member Secretary **Chairman**
Ethical Committee

26.2.14
DEAN/Convenor
Govt. Rajaji Hospital,
Madurai- 20.

6/2/14

To

APPENDIX – III

CERTIFICATION OF CONTENT VALIDITY

CERTIFICATE OF VALIDATION

This is to certify that the tool

SECTION A- Socio Demographic variables

SECTION B- Checkett's and otter bums grading system

Prepared for data collection , J.Manimozhi, II year M.sc (N) student, College of Nursing, Madurai Medical College, Madurai, who has undertaken the study field on thesis entitled "A STUDY TO COMPARE THE EFFECTIVENESS OF HYDROGEN PEROXIDE DRESSING VERSUS BETADINE DRESSING ON PIN SITE INFECTION AMONG PATIENTS WITH EXTERNAL SKELETAL FIXATORS, IN ORTHOPAEDIC WARD AT GOVERNMENT RAJAJI HOSPITAL, MADURAI-20." has been validated by me.

SIGNATURE OF THE EXPERT

NAME: Prof.Dr.P.V.PUGALENTHI
M.S. Ortho., D. Ortho.,
Chief Civil Surgeon In Orthopaedic Surgery
GOVT. RAJAJI HOSPITAL

DESIGNATION: Prof. Of Orthopaedic Surgery & Traumatology
MADURAI MEDICAL COLLEGE, MADURAI.

DATE:

CERTIFICATE OF VALIDATION

This is to certify that the tool

SECTION A- Socio Demographic Variables

SECTION B- Checkett's and otter bums grading system

Prepared for data collection , J.Manimozhi, II year M.sc (N) student, College of Nursing, Madurai Medical College, Madurai, who has undertaken the study field on thesis entitled "**A STUDY TO COMPARE THE EFFECTIVENESS OF HYDROGEN PEROXIDE DRESSING VERSUS BETADINE DRESSING ON PIN SITE INFECTION AMONG PATIENTS WITH EXTERNAL SKELETAL FIXATORS, IN ORTHOPAEDIC WARD AT GOVERNMENT RAJAJI HOSPITAL, MADURAI-20**." has been validated by me.

SIGNATURE OF THE EXPERT

NAME: G. Jaya Thanga Selvi

DESIGNATION: Head - Med Surg Dept

DATE: 25/7/2014.

CERTIFICATE OF VALIDATION

This is to certify that the tool

SECTION A- Socio Demographic Variables

SECTION B- Checkett's and otter bums grading system

Prepared for data collection , J.Manimozhi, II year M.sc (N) student, College of Nursing, Madurai Medical College, Madurai, who has undertaken the study field on thesis entitled "**A STUDY TO COMPARE THE EFFECTIVENESS OF HYDROGEN PEROXIDE DRESSING VERSUS BETADINE DRESSING ON PIN SITE INFECTION AMONG PATIENTS WITH EXTERNAL SKELETAL FIXATORS, IN ORTHOPAEDIC WARD AT GOVERNMENT RAJAJI HOSPITAL, MADURAI-20**." has been validated by me.

SIGNATURE OF THE EXPERT

NAME: Prof.Dr.P.V.PUGALENTHI
M.S. Ortho., D. Ortho.,
Chief Civil Surgeon In Orthopaedic Surgery
GOVT. RAJAJI HOSPITAL

DESIGNATION: Prof. Of Orthopaedic Surgery & Traumatology
MADURAI MEDICAL COLLEGE, MADURAI.

DATE:

CERTIFICATE OF VALIDATION

This is to certify that the tool

SECTION A- Socio Demographic Variables

SECTION B- Checkett's and otter bums grading system

Prepared for data collection , J.Manimozhi, II year M.sc (N) student, College of Nursing, Madurai Medical College, Madurai, who has undertaken the study field on thesis entitled "**A STUDY TO COMPARE THE EFFECTIVENESS OF HYDROGEN PEROXIDE DRESSING VERSUS BETADINE DRESSING ON PIN SITE INFECTION AMONG PATIENTS WITH EXTERNAL SKELETAL FIXATORS, IN ORTHOPAEDIC WARD AT GOVERNMENT RAJAJI HOSPITAL, MADURAI-20**." has been validated by me.

SIGNATURE OF THE EXPERT

Head of the Department
Medical Surgical Nursing
Dhanalakshmi Srinivasan College of Nursing
Perambalur - 621 212.

NAME:

DESIGNATION: Associate Professor

DATE: 07/08/14.

CERTIFICATE OF VALIDATION

This is to certify that the tool

SECTION A- Socio Demographic Variables

SECTION B- Checkett's and otter bums grading system

Prepared for data collection , J.Manimozhi, II year M.sc (N) student, College of Nursing, Madurai Medical College, Madurai, who has undertaken the study field on thesis entitled "**A STUDY TO COMPARE THE EFFECTIVENESS OF HYDROGEN PEROXIDE DRESSING VERSUS BETADINE DRESSING ON PIN SITE INFECTION AMONG PATIENTS WITH EXTERNAL SKELETAL FIXATORS, IN ORTHOPAEDIC WARD AT GOVERNMENT RAJAJI HOSPITAL, MADURAI-20**." has been validated by me.

L. Anand

SIGNATURE OF THE EXPERT

NAME: L.ANAND

DESIGNATION: LECTURER,
College of Nursing,
NEIGRIHMS,
Shillong

DATE: 08.08.14

CERTIFICATE OF VALIDATION

This is to certify that the tool

SECTION A- Socio Demographic Variables

SECTION B- Checkett's and otter bums grading system

Prepared for data collection , J.Manimozhi, II year M.sc (N) student, College of Nursing, Madurai Medical College, Madurai, who has undertaken the study field on thesis entitled "**A STUDY TO COMPARE THE EFFECTIVENESS OF HYDROGEN PEROXIDE DRESSING VERSUS BETADINE DRESSING ON PIN SITE INFECTION AMONG PATIENTS WITH EXTERNAL SKELETAL FIXATORS, IN ORTHOPAEDIC WARD AT GOVERNMENT RAJAJI HOSPITAL, MADURAI-20**." has been validated by me.

SIGNATURE OF THE EXPERT

NAME: Dr. (Mrs) B. SHRA)

DESIGNATION: Reader in Nursing

DATE: 27/08/14

APPENDIX-IV

INFORMED CONSENT FORM

ஒப்புதல் அறிக்கை

பெயர்: **நாள்:**

எனக்கு இந்த செவிலிய ஆய்வினைப் பற்றிய முழு விவரம் விளக்கமாக எடுத்துரைக்கப்பட்டது. இந்த ஆய்வில் பங்குகொள்வதில் உள்ள நன்மைகள் மற்றும் தீமைகள் பற்றி முழுமையாக புரிந்துகொண்டேன். இந்த ஆய்வில் தானாக முன் வந்து பங்குபெறுகிறேன். மேலும் எனக்கு இந்த ஆய்வீலிருந்து எந்த சமயத்திலும் விலகிக கொள்ள முழு அனுமதி வழங்கப்பட்டுள்ளது. என்னுடைய பெயர் மற்றும் அடையாளங்கள் ரகசியமாக வைத்துக்கொள்ளப்படும் என்றும் எனக்கு உறுதியளிக்கப்பட்டுள்ளது.

கையொப்பம்

APPENDIX – V

ஆராய்ச்சியாளரின் வடிவமைக்கப்பட்ட நேர்காணல் படிவம்

பகுதி–அ

தன்னிலை விபரக்குறிப்பு

நேர்காணல் படிவம் எண் ------

1. வயது

அ. 18 வயதுமுதல் 25 வயதுவரை ☐

ஆ. 26 வயதுமுதல் 30 வயதுவரை ☐

இ. 31 வயதுமுதல் 40 வயதுவரை ☐

ஈ. 41 வயதுமுதல் 50 வயதுவரை ☐

2. பாலினம்

அ. ஆண் ☐

ஆ. பெண் ☐

3. மதம்

அ. இந்து ☐

ஆ. கிறிஸ்தவர் ☐

இ. முஸ்லீம் ☐

ஈ. பிறமதத்தவர் ☐

4. கல்வித்தகுதி

அ. படிப்பறிவின்மை ☐

ஆ. பள்ளிக்கல்வி ☐

இ. பட்டப்படிப்பு ☐

ஈ. மற்றவை ☐

5. திருமணத்தின் நிலை

அ. திருமணமாகாதவர் ☐

ஆ. திருமணமானவர் ☐

இ. விதவை ☐

ஈ. விவாகரத்தானவர் ☐

6. பணியின் தன்மை

அ. ஓட்டுனர் ☐

ஆ. விவசாயி ☐

இ. அலுவலர் ☐

ஈ. மற்றவை ☐

7. வருமானம்

அ. ரூ.1000 - 1500 ☐

ஆ. ரூ.1501 - 2000 ☐

இ. ரூ.2001 - 2500 ☐

ஈ. ரூ.2501 - 3000 ☐

8. மருத்துவமனையில் இருக்கும் நாட்கள்

அ. ஒன்று முதல் இரண்டு வாரங்கள் ☐

ஆ. இரண்டு முதல் மூன்று வாரங்கள் ☐

இ. மூன்று முதல் நான்கு வாரங்கள் ☐

ஈ. நான்கு வாரங்களுக்குள் மேல் ☐

9. வசிக்கும் இடம்

அ. கிராமப்புறம் ☐

ஆ. நகர்ப்புறம் ☐

10. உணவுப் பழக்கவழக்கம்

அ. சைவம் ☐

ஆ. அசைவம் ☐

SECTION B

STANDARDISED TOOL

CHECKETT'S AND OTTER BURN'S GRADING SYSTEM

Grades of infection	Characteristics
Grade-I	Slight discharge Redness around the pins
Grade-II	Redness of the surrounding skin Pain and tenderness in the soft tissue Discharge of pus
Grade-III	Fail to improve with intensive local fixation can be continued treatment and antibiotics.
Grade-IV	Severe soft tissue involvement · Affecting more than one pin · Associated loosening of the pin
Grade-V	Clinical appearance same as grade-iv · Bone involvement · Radiographs show osteomyelitis
Grade-VI Sequestrum formation within the bone. A persistent sinus develops	Sequestrum formation within the bone · A persistent sinus develops

Scoring Key

Grade	Level of Infection
0	No infection
I – III	Minor Infections
IV – VI	Major Infections

APPENDIX – VI

SEMI STRUCTURE INTERVIEW SCHEDULE

SECTION -A
SOCIO-DEMOGRAPHIC VARIABLES

Sample No ____

1. Age in years
    a. 18yrs to 25 ☐
    b. 26yrsto 30 ☐
    c. 31yrs to 40 ☐
    d. 41yrs-50 ☐

2. Sex
    a. Male ☐
    b. Female ☐

3. Religion
    a. Hindu ☐
    b. Christian ☐
    c. Muslim ☐
    d. Others ☐

4. Educational status
    a. Illiterate ☐
    b. School education ☐
    c. Degree ☐
    d. Others. ☐

5. Marital status
    a. Unmarried ☐
    b. Married ☐
    c. Widow ☐
    d. Divorced ☐
    e. Separated ☐

6. Occupation

a. Driver ☐

b. Former ☐

c. Professionals ☐

d. others ☐

7. Income

a. Rs.1000-1500 ☐

b. Rs.1501-2000 ☐

c. Rs.2001-2500 ☐

d. Rs.2501-3000 ☐

8. Duration of stay in hospital

a. 1-2 weeks ☐

b. 2-3 weeks ☐

c. 3-4 weeks ☐

d. More than 4weeks. ☐

9. Locality

a. Rural ☐

b. Urban ☐

10. Dietary habits.

a. Vegetarian ☐

b. Non vegetarian ☐

APPENDIX - VII

CERTIFICATE OF ENGLISH EDITING

TO WHOMSOEVER IT MAY CONCERN

This is to certify that the dissertation "A Study to Compare the Effectiveness of Hydrogen peroxide dressing versus Betadine dressing on Pin site infection among patients with External Skeletal Fixators, in Orthopaedic ward at Government Rajaji Hospital, Madurai-20." done by Miss.J.Manimozhi., M.Sc Nursing II Year student, College of Nursing, Madurai Medical College, Madurai-20 has been edited for English language appropriateness.

Name : N. SELVAKUMAR.

Designation: M.A., B.Ed.,

Institution : G. H. S. S. VETTAIKKARANIRUPPU

Signature

GUVT. HIGHER SEC. SCHOOL,
VETTAIKKARANIRUPPU - 611 112,
NAGAPATTINAM - DIST.

APPENDIX – VIII

CERTIFICATE OF TAMIL EDITING
TO WHOMSOEVER IT MAY CONCERN

This is to certify that the dissertation "A Study to Compare the Effectiveness of Hydrogen peroxide dressing versus Betadine dressing on Pin site infection among patients with External Skeletal Fixators, in Orthopaedic ward at Government Rajaji Hospital, Madurai-20." done by Miss.J.Manimozhi M.Sc Nursing II Year student, College of Nursing, Madurai Medical College, Madurai-20 has been edited for Tamil language appropriateness.

Name : T. KARTHIKEYANI.

Designation: MA. BEd.

Institution : G.H.S.S. VETTAIKKARA NIRUPPU.

Signature

கா. கார்த்திகேயன், எம்.ஏ., பி.எட்.,
பட்டதாரி ஆசிரியர் (தமிழ்),
அரசினர் மேல்நிலைப்பள்ளி,
வேட்டைக்காரனிருப்பு - 611 112,
நாகப்பட்டினம் மாவட்டம்.

APPENDIX IX

PHOTOGRAPHS

AFTER THE INTERVENTION OF HYDROGEN PEROXIDE DRESSING AMONG PATIENT WITH EXTERNAL SKELETAL FIXATORS

AFTER THE INTERVENTION OF BETADINE DRESSING AMONG PATIENT WITH EXTERNAL SKELETAL FIXATORS